THERMAL ARC®

251

FABRICATOR®

MIG WELDING MACHINE

Service Manual

Revision No: AJ **Issue Date:** December 31, 2010 **Manual No.:** 0-4786B

Operating Features:

GMAW FCAW | 300 AMP | CV | DC | 208 V | 230 V | 1 PHASE | 60Hz

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Congratulations on your new Thermal Arc product. We are proud to have you as our customer and will strive to provide you with the best service and reliability in the industry. This product is backed by our extensive warranty and world-wide service network. To locate your nearest distributor or service agency call 1-800-462-2782, or visit us on the web at **www.Thermalarc.com.**

This Operating Manual has been designed to instruct you on the correct use and operation of your Thermal Arc product. Your satisfaction with this product and its safe operation is our ultimate concern. Therefore please take the time to read the entire manual, especially the Safety Precautions. They will help you to avoid potential hazards that may exist when working with this product.

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Above all, we are committed to develop technologically advanced products to achieve a safer working environment within the welding industry.

WARNINGS

Read and understand this entire Manual and your employer's safety practices before installing, operating, or servicing the equipment.

While the information contained in this Manual represents the Manufacturer's best judgement, the Manufacturer assumes no liability for its use.

Fabricator 251 MIG Welding Machine
Service Manual Number 0-4786B for:
Package System Part Number 100048D-002
Power Source Part Number 707237

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Record the following information for Warranty purposes:

Where Purchased: _____

Purchase Date: _____

Equipment Serial #: _____

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SECTION 1:
SAFETY INSTRUCTIONS AND WARNINGS

WARNING

PROTECT YOURSELF AND OTHERS FROM POSSIBLE SERIOUS INJURY OR DEATH. KEEP CHILDREN AWAY. PACEMAKER WEARERS KEEP AWAY UNTIL CONSULTING YOUR DOCTOR. DO NOT LOSE THESE INSTRUCTIONS. READ OPERATING/INSTRUCTION MANUAL BEFORE INSTALLING, OPERATING OR SERVICING THIS EQUIPMENT.

Welding products and welding processes can cause serious injury or death, or damage to other equipment or property, if the operator does not strictly observe all safety rules and take precautionary actions.

Safe practices have developed from past experience in the use of welding and cutting. These practices must be learned through study and training before using this equipment. Some of these practices apply to equipment

connected to power lines; other practices apply to engine driven equipment. Anyone not having extensive training in welding and cutting practices should not attempt to weld.

Safe practices are outlined in the American National Standard Z49.1 entitled: SAFETY IN WELDING AND CUTTING. This publication and other guides to what you should learn before operating this equipment are listed at the end of these safety precautions. **HAVE ALL INSTALLATION, OPERATION, MAINTENANCE, AND REPAIR WORK PERFORMED ONLY BY QUALIFIED PEOPLE.**

1.01 Arc Welding Hazards

WARNING

ELECTRIC SHOCK can kill.

Touching live electrical parts can cause fatal shocks or severe burns. The electrode and work circuit is electrically live whenever the output is on. The input power circuit and machine internal circuits are also live when power is on. In semiautomatic or automatic wire welding, the wire, wire reel, drive roll housing, and all metal parts touching the welding wire are electrically live. Incorrectly installed or improperly grounded equipment is a hazard.

1. Do not touch live electrical parts.
2. Wear dry, hole-free insulating gloves and body protection.
3. Insulate yourself from work and ground using dry insulating mats or covers.
4. Disconnect input power or stop engine before installing or servicing this equipment. Lock input power disconnect switch open, or remove line fuses so power cannot be turned on accidentally.
5. Properly install and ground this equipment according to its Owner's Manual and national, state, and local codes.
6. Turn off all equipment when not in use. Disconnect power to equipment if it will be left unattended or out of service.
7. Use fully insulated electrode holders. Never dip holder in water to cool it or lay it down on the ground or the work surface. Do not touch holders connected to two welding machines at the same time or touch other people with the holder or electrode.
8. Do not use worn, damaged, undersized, or poorly spliced cables.
9. Do not wrap cables around your body.
10. Ground the workpiece to a good electrical (earth) ground.
11. Do not touch electrode while in contact with the work (ground) circuit.
12. Use only well-maintained equipment. Repair or replace damaged parts at once.
13. In confined spaces or damp locations, do not use a welder with AC output unless it is equipped with a voltage reducer. Use equipment with DC output.
14. Wear a safety harness to prevent falling if working above floor level.
15. Keep all panels and covers securely in place.

WARNING

ARC RAYS can burn eyes and skin; NOISE can damage hearing. Arc rays from the welding process produce intense heat and strong ultraviolet rays that can burn eyes and skin. Noise from some processes can damage hearing.

1. Wear a welding helmet fitted with a proper shade of filter (see ANSI Z49.1 listed in Safety Standards) to protect your face and eyes when welding or watching.
2. Wear approved safety glasses. Side shields recommended.
3. Use protective screens or barriers to protect others from flash and glare; warn others not to watch the arc.

4. Wear protective clothing made from durable, flame-resistant material (wool and leather) and foot protection.
5. Use approved ear plugs or ear muffs if noise level is high.

WARNING

FUMES AND GASES can be hazardous to your health.

Welding produces fumes and gases. Breathing these fumes and gases can be hazardous to your health.

1. Keep your head out of the fumes. Do not breath the fumes.
2. If inside, ventilate the area and/or use exhaust at the arc to remove welding fumes and gases.
3. If ventilation is poor, use an approved air-supplied respirator.
4. Read the Material Safety Data Sheets (MSDSs) and the manufacturer's instruction for metals, consumables, coatings, and cleaners.
5. Work in a confined space only if it is well ventilated, or while wearing an air-supplied respirator. Shielding gases used for welding can displace air causing injury or death. Be sure the breathing air is safe.
6. Do not weld in locations near degreasing, cleaning, or spraying operations. The heat and rays of the arc can react with vapors to form highly toxic and irritating gases.
7. Do not weld on coated metals, such as galvanized, lead, or cadmium plated steel, unless the coating is removed from the weld area, the area is well ventilated, and if necessary, while wearing an air-supplied respirator. The coatings and any metals containing these elements can give off toxic fumes if welded.

WARNING

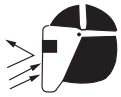
WELDING can cause fire or explosion.

Sparks and spatter fly off from the welding arc. The flying sparks and hot metal, weld spatter, hot workpiece, and hot equipment can cause fires and burns. Accidental contact of electrode or welding wire to metal objects can cause sparks, overheating, or fire.

1. Protect yourself and others from flying sparks and hot metal.
2. Do not weld where flying sparks can strike flammable material.
3. Remove all flammables within 35 ft (10.7 m) of the welding arc. If this is not possible, tightly cover them with approved covers.
4. Be alert that welding sparks and hot materials from welding can easily go through small cracks and openings to adjacent areas.
5. Watch for fire, and keep a fire extinguisher nearby.
6. Be aware that welding on a ceiling, floor, bulkhead, or partition can cause fire on the hidden side.
7. Do not weld on closed containers such as tanks or drums.
8. Connect work cable to the work as close to the welding area as practical to prevent welding current from traveling long, possibly unknown paths and causing electric shock and fire hazards.
9. Do not use welder to thaw frozen pipes.
10. Remove stick electrode from holder or cut off welding wire at contact tip when not in use.

Eye protection filter shade selector for welding or cutting (goggles or helmet), from AWS A6.2-73.

Welding or cutting Operation	*Electrode Size Metal Thickness or Welding Current*	*Filter Shade No.*	*Welding or cutting Operation*	*Electrode Size Metal Thickness or Welding Current*	*Filter Shade No.*
Torch soldering		2	**Gas metal-arc welding (MIG)**		
Torch brazing		3 or 4	Non-ferrous base metal	All	11
Oxygen Cutting			Ferrous base metal	All	12
Light	Under 1 in., 25 mm	3 or 4	Gas tungsten arc welding	All	12
Medium	1 to 6 in., 25-150 mm	4 or 5	(TIG)	All	12
Heavy	Over 6 in., 150 mm	5 or 6	Atomic hydrogen welding	All	12
Gas welding			Carbon arc welding	All	12
Light	Under 1/8 in., 3 mm	4 or 5	Plasma arc welding		
Medium	1/8 to 1/2 in., 3-12 mm	5 or 6	**Carbon arc air gouging**		
Heavy	Over 1/2 in., 12 mm	6 or 8	Light		12
Shielded metal-arc	Under 5/32 in., 4 mm	10	Heavy		14
	5/32 to 1/4 in.,	12	**Plasma arc cutting**		
	Over 1/4 in., 6.4 mm	14	Light	Under 300 Amp	9
			Medium	300 to 400 Amp	12
			Heavy	Over 400 Amp	14



WARNING

FLYING SPARKS AND HOT METAL can cause injury.

Chipping and grinding cause flying metal. As welds cool, they can throw off slag.

1. Wear approved face shield or safety goggles. Side shields recommended.
2. Wear proper body protection to protect skin.

WARNING

CYLINDERS can explode if damaged.

Shielding gas cylinders contain gas under high pressure. If damaged, a cylinder can explode. Since gas cylinders are normally part of the welding process, be sure to treat them carefully.

1. Protect compressed gas cylinders from excessive heat, mechanical shocks, and arcs.
2. Install and secure cylinders in an upright position by chaining them to a stationary support or equipment cylinder rack to prevent falling or tipping.
3. Keep cylinders away from any welding or other electrical circuits.
4. Never allow a welding electrode to touch any cylinder.
5. Use only correct shielding gas cylinders, regulators, hoses, and fittings designed for the specific application; maintain them and associated parts in good condition.
6. Turn face away from valve outlet when opening cylinder valve.
7. Keep protective cap in place over valve except when cylinder is in use or connected for use.
8. Read and follow instructions on compressed gas cylinders, associated equipment, and CGA publication P-1 listed in Safety Standards.

WARNING

Engines can be dangerous.

WARNING

ENGINE EXHAUST GASES can kill.

Engines produce harmful exhaust gases.

1. Use equipment outside in open, well-ventilated areas.
2. If used in a closed area, vent engine exhaust outside and away from any building air intakes.

WARNING

ENGINE FUEL can cause fire or explosion.

Engine fuel is highly flammable.

1. Stop engine before checking or adding fuel.
2. Do not add fuel while smoking or if unit is near any sparks or open flames.
3. Allow engine to cool before fueling. If possible, check and add fuel to cold engine before beginning job.
4. Do not overfill tank — allow room for fuel to expand.
5. Do not spill fuel. If fuel is spilled, clean up before starting engine.

WARNING

MOVING PARTS can cause injury.

Moving parts, such as fans, rotors, and belts can cut fingers and hands and catch loose clothing.

1. Keep all doors, panels, covers, and guards closed and securely in place.
2. Stop engine before installing or connecting unit.
3. Have only qualified people remove guards or covers for maintenance and troubleshooting as necessary.
4. To prevent accidental starting during servicing, disconnect negative (-) battery cable from battery.
5. Keep hands, hair, loose clothing, and tools away from moving parts.
6. Reinstall panels or guards and close doors when servicing is finished and before starting engine.

WARNING

SPARKS can cause BATTERY GASES TO EXPLODE; BATTERY ACID can burn eyes and skin.

Batteries contain acid and generate explosive gases.

1. Always wear a face shield when working on a battery.
2. Stop engine before disconnecting or connecting battery cables.
3. Do not allow tools to cause sparks when working on a battery.
4. Do not use welder to charge batteries or jump start vehicles.
5. Observe correct polarity (+ and –) on batteries.

WARNING

STEAM AND PRESSURIZED HOT COOLANT can burn face, eyes, and skin.

The coolant in the radiator can be very hot and under pressure.

1. Do not remove radiator cap when engine is hot. Allow engine to cool.
2. Wear gloves and put a rag over cap area when removing cap.
3. Allow pressure to escape before completely removing cap.

WARNING

This product, when used for welding or cutting, produces fumes or gases which contain chemicals know to the State of California to cause birth defects and, in some cases, cancer. (California Health & Safety code Sec. 25249.5 et seq.)

NOTE

Considerations About Welding And The Effects of Low Frequency Electric and Magnetic Fields

The following is a quotation from the General Conclusions Section of the U.S. Congress, Office of Technology Assessment, Biological Effects of Power Frequency Electric & Magnetic Fields - Background Paper, OTA-BP-E-63 (Washington, DC: U.S. Government Printing Office, May 1989): "...there is now a very large volume of scientific findings based on experiments at the cellular level and from studies with animals and people which clearly establish that low frequency magnetic fields and interact with, and produce changes in, biological systems. While most of this work is of very high quality, the results are complex. Current scientific understanding does not yet allow us to interpret the evidence in a single coherent framework. Even more frustrating, it does not yet allow us to draw definite conclusions about questions of possible risk or to offer clear science-based advice on strategies to minimize or avoid potential risks."

To reduce magnetic fields in the workplace, use the following procedures.

1. Keep cables close together by twisting or taping them.
2. Arrange cables to one side and away from the operator.
3. Do not coil or drape cable around the body.
4. Keep welding power source and cables as far away from body as practical.

ABOUT PACEMAKERS:

The above procedures are among those also normally recommended for pacemaker wearers. Consult your doctor for complete information.

1.02 Principal Safety Standards

Safety in Welding and Cutting, ANSI Standard Z49.1, from American Welding Society, 550 N.W. LeJeune Rd., Miami, FL 33126.

Safety and Health Standards, OSHA 29 CFR 1910, from Superintendent of Documents, U.S. Government Printing Office, Washington, D.C. 20402.

Recommended Safe Practices for the Preparation for Welding and Cutting of Containers That Have Held Hazardous Substances, American Welding Society Standard AWS F4.1, from American Welding Society, 550 N.W. LeJeune Rd., Miami, FL 33126.

National Electrical Code, NFPA Standard 70, from National Fire Protection Association, Batterymarch Park, Quincy, MA 02269.

Safe Handling of Compressed Gases in Cylinders, CGA Pamphlet P-1, from Compressed Gas Association, 1235 Jefferson Davis Highway, Suite 501, Arlington, VA 22202.

Code for Safety in Welding and Cutting, CSA Standard W117.2, from Canadian Standards Association, Standards Sales, 178 Rexdale Boulevard, Rexdale, Ontario, Canada M9W 1R3.

Safe Practices for Occupation and Educational Eye and Face Protection, ANSI Standard Z87.1, from American National Standards Institute, 1430 Broadway, New York, NY 10018.

Cutting and Welding Processes, NFPA Standard 51B, from National Fire Protection Association, Batterymarch Park, Quincy, MA 02269.

1.03 Precautions De Securite En Soudage A L'arc

MISE EN GARDE

LE SOUDAGE A L'ARC EST DANGEREUX

PROTEGEZ-VOUS, AINSI QUE LES AUTRES, CONTRE LES BLESSURES GRAVES POSSIBLES OU LA MORT. NE LAISSEZ PAS LES ENFANTS S'APPROCHER, NI LES PORTEURS DE STIMULATEUR CARDIAQUE (A MOINS QU'ILS N'AIENT CONSULTE UN MEDECIN). CONSERVEZ CES INSTRUCTIONS. LISEZ LE MANUEL D'OPERATION OU LES INSTRUCTIONS AVANT D'INSTALLER, UTILISER OU ENTRETENIR CET EQUIPEMENT.

Les produits et procédés de soudage peuvent sauser des blessures graves ou la mort, de même que des dommages au reste du matériel et à la propriété, si l'utilisateur n'adhère pas strictement à toutes les règles de sécurité et ne prend pas les précautions nécessaires.

En soudage et coupage, des pratiques sécuritaires se sont développées suite à l'expérience passée. Ces pratiques doivent être apprises par étude ou entraînement avant d'utiliser l'equipement. Toute personne n'ayant pas suivi un entraînement intensif en soudage et coupage ne devrait pas tenter de souder. Certaines pratiques concernent les équipements raccordés aux lignes d'alimentation alors que d'autres s'adressent aux groupes électrogènes.

La norme Z49.1 de l'American National Standard, intitulée "SAFETY IN WELDING AND CUTTING" présente les pratiques sécuritaires à suivre. Ce document ainsi que d'autres guides que vous devriez connaître avant d'utiliser cet équipement sont présentés à la fin de ces instructions de sécurité.

SEULES DES PERSONNES QUALIFIEES DOIVENT FAIRE DES TRAVAUX D'INSTALLATION, DE REPARATION, D'ENTRETIEN ET D'ESSAI.

1.04 Dangers relatifs au soudage à l'arc

AVERTISSEMENT

L'ELECTROCUTION PEUT ETRE MORTELLE.

Une décharge électrique peut tuer ou brûler gravement. L'électrode et le circuit de soudage sont sous tension dès la mise en circuit. Le circuit d'alimentation et les circuits internes de l'équipement sont aussi sous tension dès la mise en marche. En soudage automatique ou semi-automatique avec fil, ce dernier, le rouleau ou la bobine de fil, le logement des galets d' entrainement et toutes les pièces métalliques en contact avec le fil de soudage sont sous tension. Un équipement inadéquatement installé ou inadéquatement mis à la terre est dangereux.

1. Ne touchez pas à des pièces sous tension.
2. Portez des gants et des vêtements isolants, secs et non troués.
3 Isolez-vous de la pièce à souder et de la mise à la terre au moyen de tapis isolants ou autres.
4. Déconnectez la prise d'alimentation de l'équipement ou arrêtez le moteur avant de l'installer ou d'en faire l'entretien. Bloquez le commutateur en circuit ouvert ou enlevez les fusibles de l' alimentation afin d'éviter une mise en marche accidentelle.
5. Veuillez à installer cet équipement et à le mettre à la terre selon le manuel d'utilisation et les codes nationaux, provinciaux et locaux applicables.
6. Arrêtez tout équipement après usage. Coupez l'alimentation de l' équipement s'il est hors d'usage ou inutilisé.
7. N'utilisez que des porte-électrodes bien isolés. Ne jamais plonger les porte-électrodes dans l'eau pour les refroidir. Ne jamais les laisser traîner par terre ou sur les pièces à souder. Ne touchez pas aux porte-électrodes raccordés à deux sources de courant en même temps. Ne jamais toucher quelqu'un d'autre avec l'électrode ou le porte-électrode.
8. N'utilisez pas de câbles électriques usés, endommagés, mal épissés ou de section trop petite.
9. N'enroulez pas de câbles électriques autour de votre corps.
10. N'utilisez qu'une bonne prise de masse pour la mise à la terre de la pièce à souder.
11. Ne touchez pas à l'électrode lorsqu'en contact avec le circuit de soudage (terre).
12. N'utilisez que des équipements en bon état. Réparez ou remplacez aussitôt les pièces endommagées.
13. Dans des espaces confinés ou mouillés, n'utilisez pas de source de courant alternatif, à moins qu'il soit muni d'un réducteur de tension. Utilisez plutôt une source de courant continu.
14. Portez un harnais de sécurité si vous travaillez en hauteur.
15. Fermez solidement tous les panneaux et les capots.

AVERTISSEMENT

LE RAYONNEMENT DE L'ARC PEUT BRÛLER LES YEUX ET LA PEAU; LE BRUIT PEUT ENDOMMAGER L' OUIE.

L'arc de soudage produit une chaleur et des rayons ultraviolets intenses, susceptibles de brûler les yeux et la peau. Le bruit causé par certains procédés peut endommager l'ouïe.

1. Portez une casque de soudeur avec filtre oculaire de nuance appropriée (consultez la norme ANSI Z49 indiquée ci-après) pour vous protéger le visage et les yeux lorsque vous soudez ou que vous observez l'exécution d'une soudure.
2. Portez des lunettes de sécurité approuvées. Des écrans latéraux sont recommandés.
3. Entourez l'aire de soudage de rideaux ou de cloisons pour protéger les autres des coups d'arc ou de l'éblouissement; avertissez les observateurs de ne pas regarder l'arc.
4. Portez des vêtements en matériaux ignifuges et durables (laine et cuir) et des chaussures de sécurité.
5. Portez un casque antibruit ou des bouchons d'oreille approuvés lorsque le niveau de bruit est élevé.

AVERTISSEMENT

LES VAPEURS ET LES FUMEES SONT DANGEREUSES POUR LA SANTE.

Le soudage dégage des vapeurs et des fumées dangereuses à respirer.

1. Eloignez la tête des fumées pour éviter de les respirer.
2. A l'intérieur, assurez-vous que l'aire de soudage est bien ventilée ou que les fumées et les vapeurs sont aspirées à l'arc.
3. Si la ventilation est inadequate, portez un respirateur à adduction d'air approuvé.
4. Lisez les fiches signalétiques et les consignes du fabricant relatives aux métaux, aux produits consummables, aux revêtements et aux produits nettoyants.
5. Ne travaillez dans un espace confiné que s'il est bien ventilé; sinon, portez un respirateur à adduction d'air. Les gaz protecteurs de soudage peuvent déplacer l'oxygène de l'air et ainsi causer des malaises ou la mort. Assurez-vous que l'air est propre à la respiration.
6. Ne soudez pas à proximité d'opérations de dégraissage, de nettoyage ou de pulvérisation. La chaleur et les rayons de l'arc peuvent réagir avec des vapeurs et former des gaz hautement toxiques et irritants.

SELECTION DES NUANCES DE FILTRES OCULAIRS POUR LA PROTECTION DES YEUX EN COUPAGE ET SOUDAGE (selon AWS á 8.2-73)

Opération de coupage ou soudage	Dimension d'électrode ou Epiasseur de métal ou Intensité de courant	Nuance de filtre oculaire	Opération de coupage ou soudage	Dimension d'électrode ou Epiasseur de métal ou Intensité de courant	Nuance de filtre oculaire
Brassage tendre au chalumeau	toutes conditions	2	Soudage á l'arc sous gaz avec fil plein (GMAW)		
Brassage fort au chalumeau	toutes conditions	3 ou 4	métaux non-ferreux	toutes conditions	11
Oxycoupage			métaux ferreux	toutes conditions	12
mince	moins de 1 po. (25 mm)	2 ou 3	Soudage á l'arc sous gaz avec électrode de tungstène (GTAW)	toutes conditions	12
moyen	de 1 á 6 po. (25 á 150 mm)	4 ou 5	Soudage á l'hydrogène atomique (AHW)	toutes conditions	12
épais	plus de 6 po. (150 mm)	5 ou 6	Soudage á l'arc avec électrode de carbone (CAW)	toutes conditions	12
Soudage aux gaz			Soudage á l'arc Plasma (PAW)	toutes dimensions	12
mince	moins de 1/8 po. (3 mm)	4 ou 5	Gougeage Air-Arc avec électrode de carbone		
moyen	de 1/8 á 1/2 po. (3 á 12 mm)	5 ou 6	mince		12
épais	plus de 1/2 po. (12 mm)	6 ou 8	épais		14
Soudage á l'arc avec électrode enrobees (SMAW)	moins de 5/32 po. (4 mm)	10	Coupage á l'arc Plasma (PAC)		
	5/32 á 1/4 po. (4 á 6.4 mm)	12	mince	moins de 300 amperès	9
	plus de 1/4 po. (6.4 mm)	14	moyen	de 300 á 400 amperès	12
			épais	plus de 400 amperès	14

7. Ne soudez des tôles galvanisées ou plaquées au plomb ou au cadmium que si les zones à souder ont été grattées à fond, que si l'espace est bien ventilé; si nécessaire portez un respirateur à adduction d'air. Car ces revêtements et tout métal qui contient ces éléments peuvent dégager des fumées toxiques au moment du soudage.

AVERTISSEMENT

LE SOUDAGE PEUT CAUSER UN INCENDIE OU UNE EXPLOSION

L'arc produit des étincellies et des projections. Les particules volantes, le métal chaud, les projections de soudure et l'équipement surchauffé peuvent causer un incendie et des brûlures. Le contact accidentel de l' électrode ou du fil-électrode avec un objet métallique peut provoquer des étincelles, un échauffement ou un incendie.

1. Protégez-vous, ainsi que les autres, contre les étincelles et du métal chaud.
2. Ne soudez pas dans un endroit où des particules volantes ou des projections peuvent atteindre des matériaux inflammables.
3. Enlevez toutes matières inflammables dans un rayon de 10, 7 mètres autour de l'arc, ou couvrez-les soigneusement avec des bâches approuvées.
4. Méfiez-vous des projections brulantes de soudage susceptibles de pénétrer dans des aires adjacentes par de petites ouvertures ou fissures.
5. Méfiez-vous des incendies et gardez un extincteur à portée de la main.
6. N'oubliez pas qu'une soudure réalisée sur un plafond, un plancher, une cloison ou une paroi peut enflammer l'autre côté.
7. Ne soudez pas un récipient fermé, tel un réservoir ou un baril.
8. Connectez le câble de soudage le plus près possible de la zone de soudage pour empêcher le courant de suivre un long parcours inconnu, et prévenir ainsi les risques d'électrocution et d' incendie.
9. Ne dégelez pas les tuyaux avec un source de courant.
10. Otez l'électrode du porte-électrode ou coupez le fil au tube-contact lorsqu'inutilisé après le soudage.
11. Portez des vêtements protecteurs non huileux, tels des gants en cuir, une chemise épaisse, un pantalon revers, des bottines de sécurité et un casque.

AVERTISSEMENT

LES ETINCELLES ET LES PROJECTIONS BRULANTES PEUVENT CAUSER DES BLESSURES.

Le piquage et le meulage produisent des particules métalliques volantes. En refroidissant, la soudure peut projeter du éclats de laitier.

1. Portez un écran facial ou des lunettes protectrices approuvées. Des écrans latéraux sont recommandés.
2. Portez des vêtements appropriés pour protéger la peau.

AVERTISSEMENT

LES BOUTEILLES ENDOMMAGEES PEUVENT EXPLOSER

Les bouteilles contiennent des gaz protecteurs sous haute pression. Des bouteilles endommagées peuvent exploser. Comme les bouteilles font normalement partie du procédé de soudage, traitez-les avec soin.

1. Protégez les bouteilles de gaz comprimé contre les sources de chaleur intense, les chocs et les arcs de soudage.
2. Enchainez verticalement les bouteilles à un support ou à un cadre fixe pour les empêcher de tomber ou d'être renversées.
3. Eloignez les bouteilles de tout circuit électrique ou de tout soudage.
4. Empêchez tout contact entre une bouteille et une électrode de soudage.
5. N'utilisez que des bouteilles de gaz protecteur, des détendeurs, des boyauxs et des raccords conçus pour chaque application spécifique; ces équipements et les pièces connexes doivent être maintenus en bon état.
6. Ne placez pas le visage face à l'ouverture du robinet de la bouteille lors de son ouverture.
7. Laissez en place le chapeau de bouteille sauf si en utilisation ou lorsque raccordé pour utilisation.
8. Lisez et respectez les consignes relatives aux bouteilles de gaz comprimé et aux équipements connexes, ainsi que la publication P-1 de la CGA, identifiée dans la liste de documents ci-dessous.

AVERTISSEMENT

LES MOTEURS PEUVENT ETRE DANGEREUX

LES GAZ D'ECHAPPEMENT DES MOTEURS PEUVENT ETRE MORTELS.

Les moteurs produisent des gaz d'échappement nocifs.

1. Utilisez l'équipement à l'extérieur dans des aires ouvertes et bien ventilées.
2. Si vous utilisez ces équipements dans un endroit confiné, les fumées d'échappement doivent être envoyées à l'extérieur, loin des prises d'air du bâtiment.

AVERTISSEMENT

LE CARBURANT PEUR CAUSER UN INCENDIE OU UNE EXPLOSION.

Le carburant est hautement inflammable.

1. Arrêtez le moteur avant de vérifier le niveau e carburant ou de faire le plein.
2. Ne faites pas le plein en fumant ou proche d'une source d'étincelles ou d'une flamme nue.
3. Si c'est possible, laissez le moteur refroidir avant de faire le plein de carburant ou d'en vérifier le niveau au début du soudage.
4. Ne faites pas le plein de carburant à ras bord: prévoyez de l' espace pour son expansion.
5. Faites attention de ne pas renverser de carburant. Nettoyez tout carburant renversé avant de faire démarrer le moteur.

AVERTISSEMENT

DES PIECES EN MOUVEMENT PEUVENT CAUSER DES BLESSURES.

Des pièces en mouvement, tels des ventilateurs, des rotors et des courroies peuvent couper doigts et mains, ou accrocher des vêtements amples.

1. Assurez-vous que les portes, les panneaux, les capots et les protecteurs soient bien fermés.
2. Avant d'installer ou de connecter un système, arrêtez le moteur.
3. Seules des personnes qualifiées doivent démonter des protecteurs ou des capots pour faire l'entretien ou le dépannage nécessaire.
4. Pour empêcher un démarrage accidentel pendant l'entretien, débranchez le câble d'accumulateur à la borne négative.
5. N'approchez pas les mains ou les cheveux de pièces en mouvement; elles peuvent aussi accrocher des vêtements amples et des outils.
6. Réinstallez les capots ou les protecteurs et fermez les portes après des travaux d'entretien et avant de faire démarrer le moteur.

AVERTISSEMENT

DES ETINCELLES PEUVENT FAIRE EXPLOSER UN ACCUMULATEUR; L'ELECTROLYTE D'UN ACCUMULATEUR PEUT BRULER LA PEAU ET LES YEUX.

Les accumulateurs contiennent de l'électrolyte acide et dégagent des vapeurs explosives.

1. Portez toujours un écran facial en travaillant sur un accumulateur.
2. Arrêtez le moteur avant de connecter ou de déconnecter des câbles d'accumulateur.
3. N'utilisez que des outils anti-étincelles pour travailler sur un accumulateur.
4. N'utilisez pas une source de courant de soudage pour charger un accumulateur ou survolter momentanément un véhicule.
5. Utilisez la polarité correcte (+ et –) de l'accumulateur.

AVERTISSEMENT

LA VAPEUR ET LE LIQUIDE DE REFROIDISSEMENT BRULANT SOUS PRESSION PEUVENT BRULER LA PEAU ET LES YEUX.

Le liquide de refroidissement d'un radiateur peut être brûlant et sous pression.

1. N'ôtez pas le bouchon de radiateur tant que le moteur n'est pas refroidi.
2. Mettez des gants et posez un torchon sur le bouchon pour l'ôter.
3. Laissez la pression s'échapper avant d'ôter complètement le bouchon.

1.05 Principales Normes De Securite

Safety in Welding and Cutting, norme ANSI Z49.1, American Welding Society, 550 N.W. LeJeune Rd., Miami, FL 33128.

Safety and Health Standards, OSHA 29 CFR 1910, Superintendent of Documents, U.S. Government Printing Office, Washington, D.C. 20402.

Recommended Safe Practices for the Preparation for Welding and Cutting of Containers That Have Held Hazardous Substances, norme AWS F4.1, American Welding Society, 550 N.W. LeJeune Rd., Miami, FL 33128.

National Electrical Code, norme 70 NFPA, National Fire Protection Association, Batterymarch Park, Quincy, MA 02269.

Safe Handling of Compressed Gases in Cylinders, document P-1, Compressed Gas Association, 1235 Jefferson Davis Highway, Suite 501, Arlington, VA 22202.

Code for Safety in Welding and Cutting, norme CSA W117.2 Association canadienne de normalisation, Standards Sales, 276 Rexdale Boulevard, Rexdale, Ontario, Canada M9W 1R3.

Safe Practices for Occupation and Educational Eye and Face Protection, norme ANSI Z87.1, American National Standards Institute, 1430 Broadway, New York, NY 10018.

Cutting and Welding Processes, norme 51B NFPA, National Fire Protection Association, Batterymarch Park, Quincy, MA 02269.

SECTION 2: INTRODUCTION

2.01 How To Use This Manual

This Service Manual applies to only the specification or part numbers listed on page i.

To ensure safe operation, read the entire manual, including the chapter on safety instructions and warnings.

Throughout this manual, the words **WARNING, CAUTION**, and **NOTE** may appear. Pay particular attention to the information provided under these headings. These special annotations are easily recognized asfollows:

WARNING

A WARNING gives information regarding possible personal injury.

CAUTION

A CAUTION refers to possible equipment damage.

NOTE

A NOTE offers helpful information concerning certain operating procedures.

Additional copies of this manual may be purchased by contacting Thermadyne at the address and phone number in your area listed in the inside back cover of this manual. Include the Service Manual number and equipment identification numbers.

Electronic copies of this manual can also be downloaded at no charge in Acrobat PDF format by going to the Thermal Arc web site listed below and clicking on the Literature link:

http://www.thermalarc.com

2.02 Equipment Identification

The unit's identification number (specification or part number), model, and serial number usually appear on a nameplate attached to the rear panel. In some cases, the nameplate may be attached to the control panel. Equipment which does not have a name plate such as gun and cable assemblies is identified only by the specification or part number printed on the shipping container. Record these numbers on the bottom of page i for future reference.

2.03 Symbol Chart

Note that only some of these symbols will appear on your model.

	On
	Off
	Dangerous Voltage
	Increase/Decrease
	Circuit Breaker
	AC Auxiliary Power
	Fuse
A	Amperage
V	Voltage
Hz	Hertz (cycles/sec)
f	Frequency
—	Negative
+	Positive
⎓	Direct Current (DC)
	Protective Earth (Ground)
	Line
	Line Connection
	Auxiliary Power
115V 15A	Receptacle Rating- Auxiliary Power

1 ~	Single Phase
3 ~	Three Phase
	Three Phase Static Frequency Converter-Transformer-Rectifier
	Remote
X	Duty Cycle
%	Percentage
	Panel/Local
	Shielded Metal Arc Welding (SMAW)
	Gas Metal Arc Welding (GMAW)
	Gas Tungsten Arc Welding (GTAW)
	Air Carbon Arc Cutting (CAC-A)
	Constant Current
	Constant Voltage Or Constant Potential
	High Temperature
	Fault Indication
	Arc Force
	Touch Start (GTAW)
	Variable Inductance
V	Voltage Input

	Wire Feed Function
	Wire Feed Towards Workpiece With Output Voltage Off.
	Welding Gun
	Purging Of Gas
	Continuous Weld Mode
	Spot Weld Mode
t	Spot Time
t1	Preflow Time
t2	Postflow Time
	2 Step Trigger Operation Press to initiate wirefeed and welding, release to stop.
	4 Step Trigger Operation Press and hold for preflow, release to start arc. Press to stop arc, and hold for preflow.
t	Burnback Time
IPM	Inches Per Minute
MPM	Meters Per Minute

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2.04 General Information

The Fabricator 251 is a semiautomatic Gas Metal Arc Welder (GMAW-commonly MIG) with an integrated wire feed unit. The Power Supply is designed to meet the broad operating needs of the metal fabrication industry where production efficiency is vital. The Fabricator 251 is designed and manufactured to meet the requirements of CSA and IEC 60974-1 standards.

The Fabricator 251 gives excellent performance on mild steel, stainless steel, aluminum, silicon bronze and some hard facing wires with Argon based shielding gases. The Power Supply also gives excellent results on mild steel using Carbon Dioxide shielding gas.

The Fabricator 251 is supplied as a complete package ready to weld (apart from gas cylinder and electrode wire). The following instructions detail how to correctly set up the welder and give guidelines on gaining the best production efficiency from the Power Supply. Please read these instructions thoroughly before using your Fabricator welder.

2.05 Safety

The following basic safety rules should always be followed:

- Ensure the machine is correctly installed, if necessary, by a qualified electrician.
- Ensure the Power Supply is grounded correctly (electrically) in accordance with local regulations.
- Excessive heat in the welding cables may cause fire. Never weld with poor electrical connections, damaged welding cables or exceed the welding cable current rating as this will produce excessive heat and may cause a fire.
- Always wear the correct protective clothing for protection from sparks, molten particles and arc rays.
- When welding in confined spaces, always ensure adequate ventilation and constant observation of the operator.
- Keep combustible materials away from the welding area. Have a suitable fire extinguisher handy.
- Never watch the welding arc with naked eyes. Always use and wear a welding mask fitted with the correct filter lens.
- Do not stand on damp ground when welding.

For more complete safety advice please read section 1.

2.06 Protective Filter Lenses

Protective filter lenses are provided to reduce the intensity of radiation entering the eye thus filtering out harmful infrared, ultraviolet radiation and a percentage of the visible light. Such filter lenses are incorporated within face shields. To prevent damage to the filter lenses from molten or hard particles an additional hard clear glass or special plastic external cover lens should be used. This cover lens should always be kept in place and replaced before the damage impairs your vision while welding.

Approximate range of welding current	Filter lens required for MIG
Up to 150	Shade 10
150-250	Shade 11
250-300	Shade 12
300-350	Shade 13
Over 350	Shade 14

Table 2-1: Filter Lens Size Versus Welding Current

It is recommended to use a welding helmet, conforming to the local relevant Standards when electric arc welding. Use a welding helmet in serviceable condition with the correct filter lens. Refer to Table 2-1 above and AWS table in Section 1.

2.07 User Responsibility

This equipment will perform as per the information contained herein when installed, operated, maintained and repaired in accordance with the instructions provided. This equipment must be checked periodically. Defective equipment (including welding leads) should not be used. Parts that are broken, missing, plainly worn, distorted or contaminated, should be replaced immediately. Should such repairs or replacements become necessary, it is recommended that such repairs be carried out by appropriately qualified persons approved by Thermal Arc. Advice in this regard can be obtained by contacting Thermal Arc.

This equipment or any of its parts should not be altered from standard specification without prior written approval of Thermal Arc. The purchaser of this equipment shall have the sole responsibility for any malfunction which results from improper use or unauthorized modification from standard specification,

faulty maintenance, damage or improper repair by anyone other than appropriately qualified persons approved by Thermal Arc.

2.08 Duty Cycle

The rated duty cycle of a welding Power Supply is the operating time it may be used at its rated output current without exceeding the temperature limits of the insulation of the component parts. To explain the ten minute duty cycle period the following example is used. Suppose a welding Power Supply is designed to operate at 60% duty cycle, 250 amperes at 26.5 volts. This means that it has been designed and built to provide the rated amperage (250A) at the rated load voltage (26.5V), for 6.0 minutes out of every 10 minute period (60% of 10 minutes is 6.0 minutes). During the other 4.0 minutes of the 10 minute period the Power Supply must idle and be allowed to cool. The thermal cutout will operate if the duty cycle is exceeded.

2.09 Specifications for Fabricator 251

MIG Gun Specifications	
Gun Catalog Number	43340
Gun Type	TWECO Weldskill 300 Amp
Gun Cable Length	15 ft (4.5m)

Table 2-2: MIG Gun Specifications

Wire Drive Specifications Fabricator 251					
Control Circuit Supply	30VA @ 32VAC				
Wire Drive Motor Supply	180VA @ 14 to 46VAC				
Wire Speed Range	80 to 800 ipm (2 to 20 m/min)				
Wire Diameter	.023" (0.6mm)	.030" (0.8mm)	.035" (0.9mm)	.045" (1.2mm)	1/16" (1.6mm)
Mild Steel:	Y	Y	Y	Y	
Stainless Steel:	Y	Y	Y	Y	
Aluminum:		Y	Y	Y	Y
Flux Cored:		Y	Y	Y	Y
Wire Spool Size Capacity	44 lb, 33 lb, 10 lb, 8" and 12" wire spool sizes.				

Table 2-3: Wire Drive Specifications

Fabricator 251		
Package System Part Number	100048D-002	
Power Source Part Number	707237	
Power Source Weight	227lb (103kg)	
Power Source Dimensions HxWxD (including wheels and cylinder carrier)	32" x 27-3/16" x 36-3/4" (813 x 691 x 933mm)	
Nominal Input Voltage	208V	230V
Number of Phases	1Ø	
Frequency	60 Hz	
Flexible Supply Cable Size Supply Plug	10ft (3m) 10AWG NEMA 6-50P	
Rated Input Current @ 100% Duty Cycle	* 36A	* 32.6A
Rated kVA @ 100% Duty Cycle	7.5 kVA	7.5 kVA
Maximum Input Current @ 250A Output	68A	62A
Generator Requirements	20 kVA	20 kVA
Supply VA @ Maximum Output	15 kVA	15 kVA
Recommended Primary Circuit Size	50A	50A
Recommended Minimum Primary Fuse Size	** 70A	** 70A
Open Circuit Voltage Range	15.6 – 45.9V DC	15.6 – 45.9V DC
Welding Arc Voltage Range	14.5 – 31.7V DC	14.5 – 31.7V DC
Output Current Range	20 – 300A DC	20 – 300A DC
Rated Output Duty Cycle @ 104ºF	250A/26.5V @ 60%	250A/26.5V @ 60%
Maximum Duty Cycle @ 104ºF	300A/31.7V @ 40%	300A/31.7V @ 40%
100% Duty Cycle Output Rating @ 104ºF	195A DC at 24V	195A DC at 24V
Duty Cycle Period	10 minutes	
Number of Output Voltage Values	24	
Electrode Wire Type and Diameter		
Mild / Stainless Steel	.023" (0.6mm) – .045" (1.2mm)	
Aluminum	.030" (0.8mm) – 1/16" (1.6mm)	
Flux Cored	.030" (0.8mm) – 1/16" (1.6mm)	
Wire Feed Speed Range	80 – 800 ipm (2 – 20 m/min)	
Wire Spool Size Diameter	8" / 12" (200mm / 300mm)	
Burn-Back Timer Range	0 – 0.6 seconds	
Burn-Back Time Factory Set to	0.16 seconds	
Spot Timer Range	0.5 – 9 seconds	
Dwell Timer Range	1 – 12 seconds	
Stitch Weld Time Weld (Stitch) Time	0.5 – 9 seconds	
Dwell (non-weld) Time	1 – 12 seconds	
Thermal Protection	Self-resetting thermostat fitted to rectifier and transformer	
Operating Temperature Range	32° to 104°F (0° to 40°C)	

* The Rated Input Current should be used for the determination of cable size & supply requirements.

** Motor start fuses or thermal circuit breakers are recommended for this application. Check local requirements for your situation in this regard.

Table 2-4: Machine Specifications

2.10 Included Items for Fabricator 251

Fabricator 251 Package System Contents	
Factory Fitted Wheeling Kit	Y
Factory Fitted Dual Cylinder Rack	Y
Factory Fitted Primary Power Cable 8AWG, 10ft (3m) with Plug NEMA 6-50P	Y
Work Lead 10ft (3m)	Y
Cable Stowage Hooks	Y
Regulator/Flow Meter – Argon Mix Gases	Y
Tweco Weldskill MIG Gun 300 Amp, 15ft (4.5m)	Y
Fitted Feed Roll for .035” - .045” (0.9 – 1.2mm) solid wire	Y
Accessories Box	Y

Table 2-8: Power Supply Contents

2.11 Optional Accessories

Refer to the Appendix section of this manual for the list of available options and accessories.

SECTION 3: INSTALLATION

3.01 Environment

The Fabricator 251 is NOT designed for use in environments with increased hazard of electric shock.

Examples of environments with increased hazard of electric shock are:

In locations in which freedom of movement is restricted, so that the operator is forced to perform the work in a cramped (kneeling, sitting or lying) position with physical contact with conductive parts;

In locations which are fully or partially limited by conductive elements, and in which there is a high risk of unavoidable or accidental contact by the operator, or

In wet or damp hot locations where humidity or perspiration considerably reduces the skin resistance of the human body and the insulation properties of accessories.

Environments with increased hazard of electric shock do not include places where electrically conductive parts in the near vicinity of the operator, which can cause increased hazard, have been insulated.

3.02 Location

Be sure to locate the Power Supply according to the following guidelines:

In areas, free from moisture and dust.

In areas, free from oil, steam and corrosive gases.

In areas, not subjected to abnormal vibration or shock.

In areas, not exposed to direct sunlight or rain.

Place at a distance of 1 foot (300 mm) or more from walls or similar that could restrict natural air flow for cooling.

The minimum ground clearance for these products is 5.5" (140mm).

3.03 Ventilation

Since the inhalation of welding fumes can be harmful, ensure that the welding area is effectively ventilated.

3.04 Primary Power Requirements

The primary supply voltage should be within ± 10% of the rated primary supply voltage. Too low of a supply voltage may cause poor welding performance or wirefeeder malfunction. Too high of a supply voltage will cause components to overheat and possibly fail.

Install a power outlet for each Power Supply and fit fuses as per the machine specifications.

WARNING

Thermal Arc advises that your Fabricator 251 be electrically connected by a qualified electrical tradesperson.

The Fabricator 251 Power Supply is factory connected for the following input power supply voltage:

Input Power Supply Lead Size	Lead Current Rating	Lead Length	Machine Voltage Setting	Duty Cycle
8 AWG	40 Amps	10ft (3m)	230V	250A @ 60%

Table 3-1: Factory Fitted Input Power Supply Leads Fitted to the Fabricator 251

3.05 Alternative Primary Input

WARNING

The Fabricator 251 input power supply lead should be replaced with leads as specified in Table 3-2 when the Fabricators input power supply voltage is changed.

The Power Supply is suitable for use on the following input power supply voltages:

Input Power Supply Voltage Setting	Primary Input Supply Lead Size	Input Power Outlet Size	Fuse Size	Duty Cycle
208V	8AWG (8.0mm2)	50 Amps	*70Amp	250A @ 60%
230V	8AWG (8.0mm2)	50 Amps	*70Amp	250A @ 60%

Table 3-2: Primary Input Supply Lead Sizes for Alternative Mains Supply Voltages

*Motor start fuses or thermal circuit breakers are recommended for this application. National Electrical Code Standards permit the rating of the fuse or thermal circuit breaker protecting the circuit conductors to be double the standard rating for any circuit used exclusively for an electric arc welder. Check local requirements for your situation in this regard.

Changing the Voltage Selection

1. Disconnect the power supply from the input power source.
2. Refer to Figure 3-1. The power supply comes wired for 230V. Locate the two blue input power wires where they are secured to the input voltage selection block. Loosen the set screw for both voltage locations.
3. Remove the blue wires from the current location and Insert them into the new voltage location. Secure by tightening the set screw onto the uninsulated portion of the wires. Secure the other voltage set screw as well.

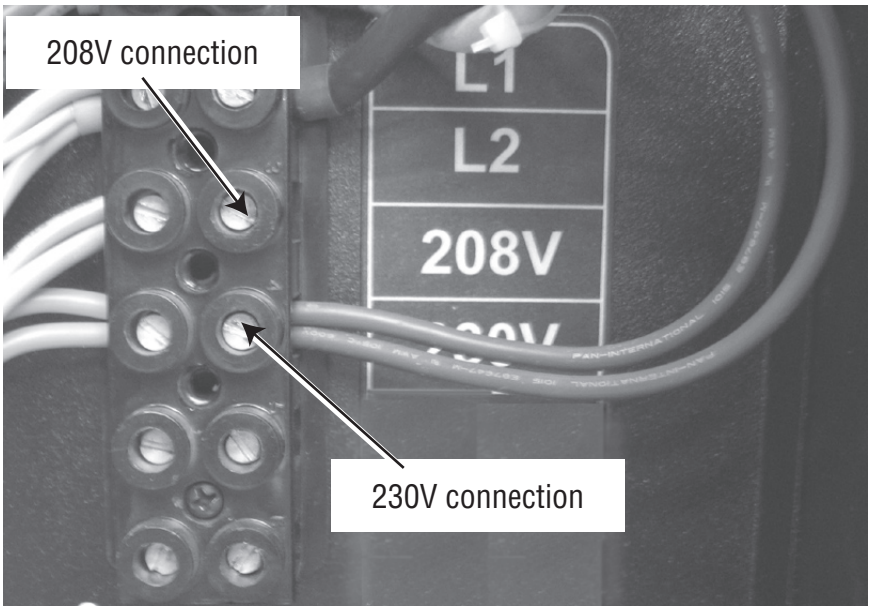

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Figure 3-1: Voltage Selections for Fabricator 251 (Wired for 230V)

3.06 Quick Setup

CAUTION

To obtain adequate air flow and cooling for the Power Supply components, the four wheels must be fitted. Alternatively, the Power Supply may be raised 5.5" (140 mm) from the floor using supports that do not restrict airflow.

NOTE

The steps in this subsection are intended for individuals experienced in the set up of this type welder. More detailed setup instructions are in the 3.07 and following subsections.

1. Connect the work lead to the negative (-) socket (positive + for Self Shielded Flux Cored Wire)
2. Connect the *GUN* lead to the positive (+) socket (negative - for Self Shielded Flux Cored Wire)

NOTE

See Section 3.16 "Polarity Changeover" for more detail and exceptions!

3. Position a gas cylinder on the rear tray and secure to the Power Supply cylinder bracket with the chain provided. If this arrangement is not used then ensure that the gas cylinder is secured to a building pillar, wall bracket or otherwise securely fixed in an upright position.

WARNING

If the gas cylinder is not secured to the cylinder tray, the power supply must be kept from moving to avoid over-extending the gas hose which can result in personal injury, damage to the power supply, flow meter and gas cylinder.

4. Fix the cable stowage hook to the Power Supply cylinder bracket with the bolts provided.
5. Fit the gas Regulator/Flow Meter to the gas cylinder and connect the gas hose from the rear of the Power Supply to the Flow Meter outlet.
6. The machine is fitted with a .035/.045" vee groove feed roll suited for hard wire. Change this feed roll if required to fit your chosen wire size.
7. Fit the electrode wire spool to the wire reel hub located behind the electrode wire compartment door.
8. Fit the TWECO Weldskill MIG gun and trigger wires through/to the front of the unit.
9. Remove the contact tip from the gun.
10. With the gun lead reasonably straight, feed the wire through the wire drive rolls and gun.
11. Fit the appropriate contact tip and replace insulator and nozzle.

3.07 Installation of Shielding Gas (GMAW) Process

NOTE

Shielding Gas is not required if the unit is used with self shielded FCAW (flux cored arc welding) wires

1. **Cylinder positioning:** Block the wheels of the unit so it cannot roll. Carefully stand the cylinder on the tray and with one foot, press against the bottom of the cylinder to assure it is against the back of the unit. Chain the cylinder in place. (Refer to Figure 3-2 for Wheel Kit cylinder installation)
2. **Cracking:** Remove the large metal cap on top of the cylinder by rotating counter clockwise. Next remove the dust seal. Position yourself so the valve is pointed away from you and quickly open and close the valve for a burst of gas. This is called "Cracking" and is done to blow out any foreign matter that may be lodged in the fitting. (Figure 3-2.)
3. **Fit Regulator/Flow Meter to cylinders:** Screw the regulator into the appropriate cylinder. (Figure 3-2) The nuts on the regulator and hose connections are right hand (RH) threaded and need to be turned in a clockwise direction in order to tighten. Tighten with a wrench.

CAUTION

Match regulator to cylinder. NEVER CONNECTa regulator designed for a particular gas orgases to a cylinder containing any other gas.

4. Attach supplied gas line between the regulator output and the desired input at the rear of the power supply depending on Spool Gun or MIG Gun use. (Refer to Figure 3-2 and 3-13).

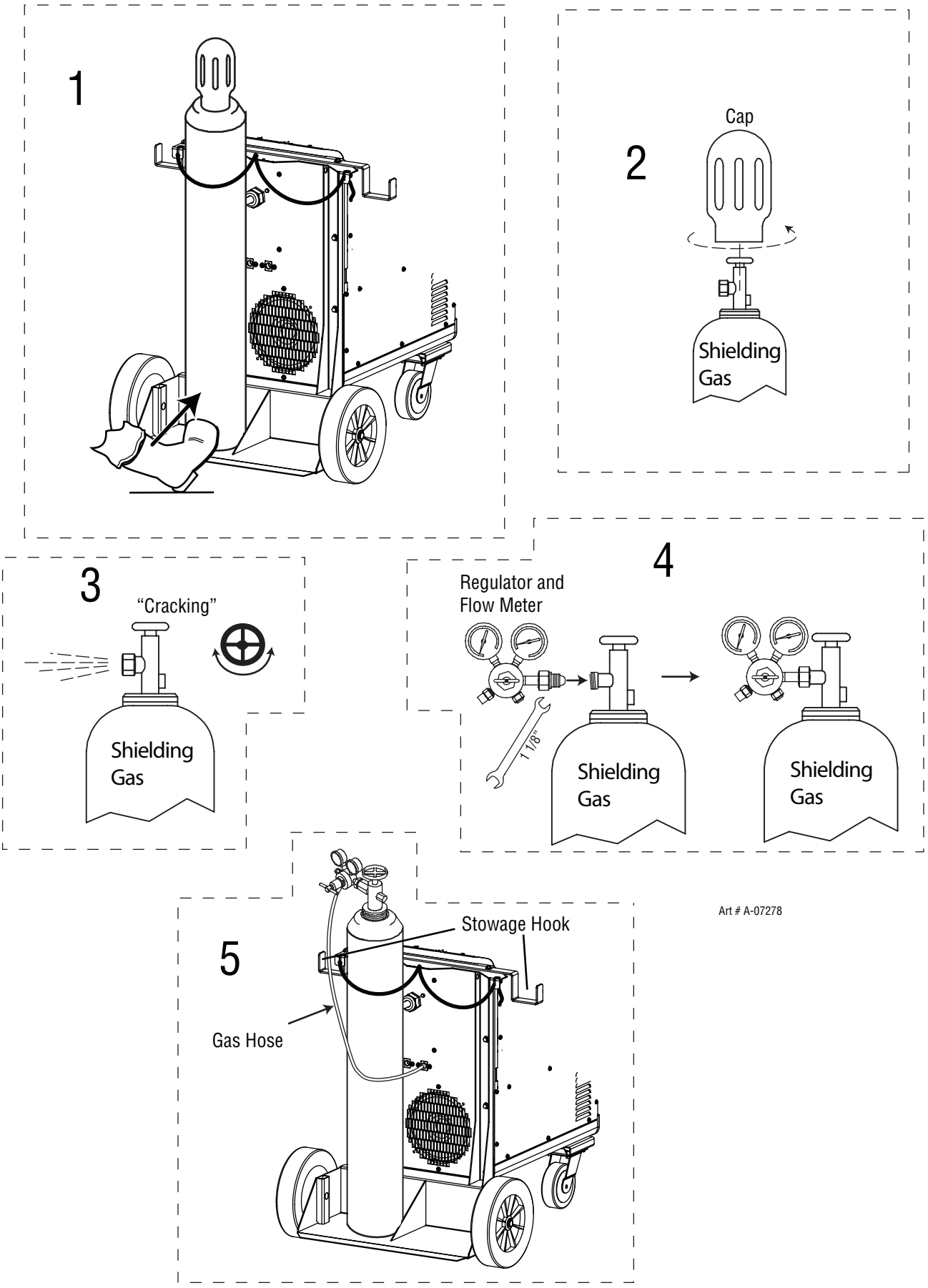


Figure 3-2 Gas Cylinder Installation

Adjusting Regulator

Adjust control knob of regulator to the required flow rate, indicated on gauge dial. (Refer to Figure 3-3)

The gas flow rate should be adequate to cover the weld zone to stop weld porosity. Excessive gas flow rates may cause turbulence and weld porosity.

Argon or argon based gas flow rates:

- Workshop welding: 20-30 CFH
- Outdoors welding: 30-40 CFH

Helium based or CO2 gas flow rates:

- Workshop welding: 30-40 CFH
- Outdoors welding: 40-50 CFH

NOTE

All valves downstream of the regulator must be opened to obtain a true flow rate readingon the outlet gauge. (Welding power source must be triggered) Close the valves after thepressure has been set.

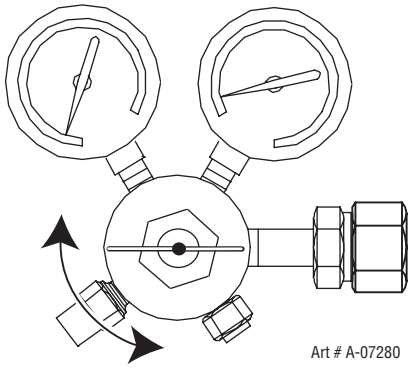


Figure 3-3: Adjusting Flow Rate

Refer to section 4.09 for suggested gas / filler metal combinations.

NOTE

The regulator/flow meters used with argon based and carbon dioxide shielding gases aredifferent. The regulator/flow meter supplied is for argon based shielding gases. If carbondioxide is to be used a suitable carbon dioxide regulator/flow meter will need to be fitted.

3.08 Attaching the Gun and Cable Assembly to the Power Source

The Fabricator 251 is supplied with a Tweco Weldskill 300 AMP gas-cooled gun. The Weldskill gun is designed with an ergonomic handle and fewer parts to cause performance problems. The Weldskill gun uses standard readily available Tweco Weldskill consumable parts.

1. Open the door panel to the machine by inserting your left and right index fingers into the two release mechanisms marked with hand arrows in Figure 3-4. Slide them toward each other and pull the cover outward and up to open.

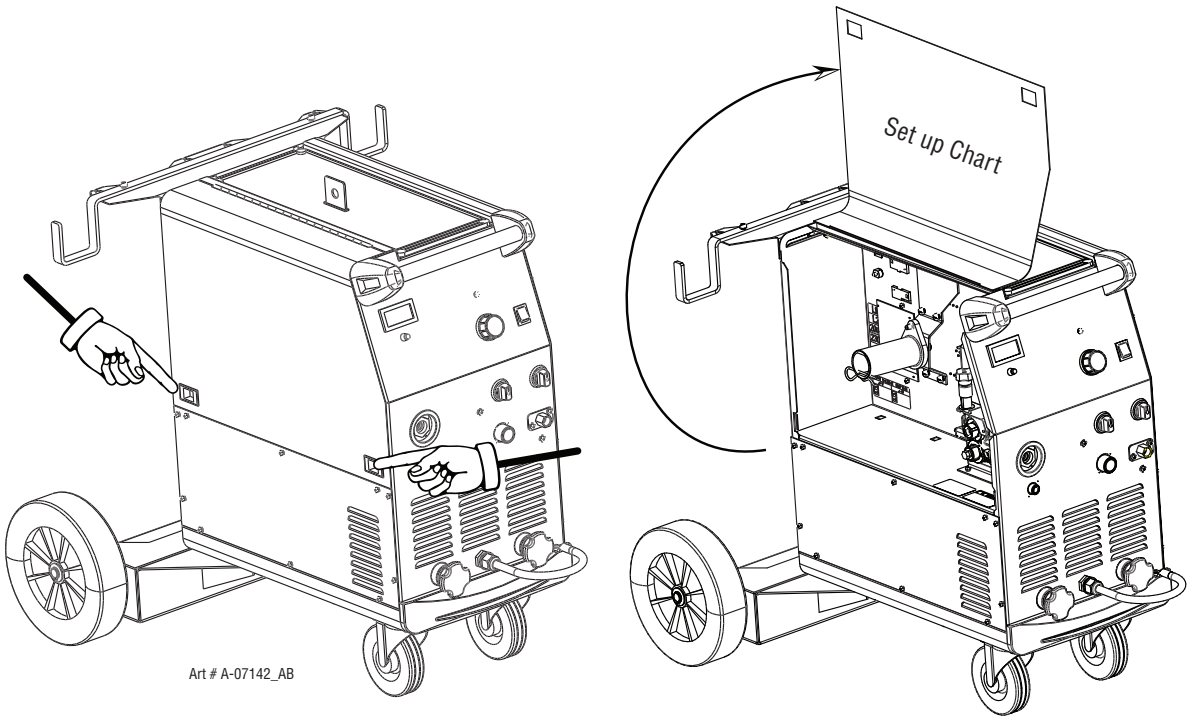


Figure 3-4: Door Panel Opening

NOTE

Lubricate the O-ring on the quick-connect fitting of the gun cable with grease (Dow company #4 compound or equivalent, or Thermal Arc #903910)

2. Route the gun cable through the access hole in the front panel. Refer to Figures 3-5 and -3-6.
3. Loosen the thumbscrew and insert the gun cable end as far as it will go. Tighten thumbscrew. Refer to Figure 3-6.
4. Align the keyways of the Gun Switch connector with the receptacle below the gun cable and plug them together. Secure by turning the locking ring to the right (clockwise). Refer to Figure 3-6.

NOTE

When disconnecting gun switch leads from the machine, loosen the locking ring and grab the connectors and pull. Do not pull on the wires.

5. To remove the gun, reverse these directions.

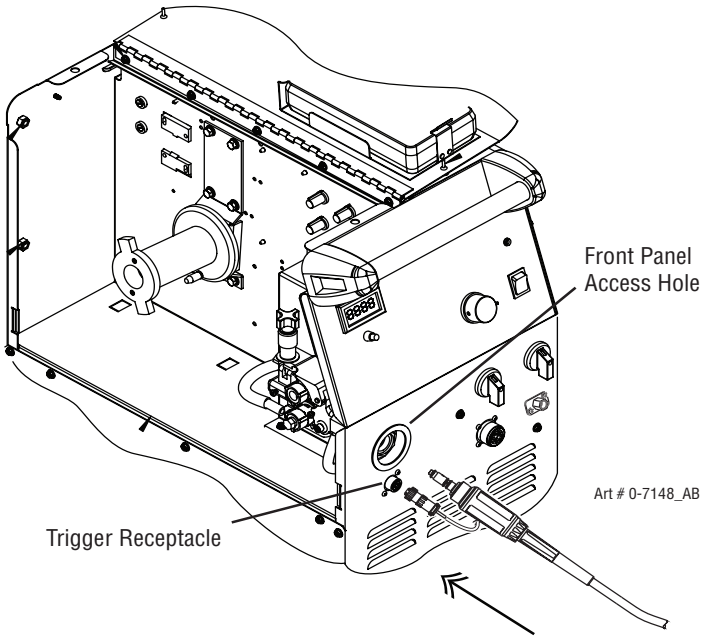


Figure 3-5: Route Gun Cable Through Front Panel Access Hole and Connect Trigger

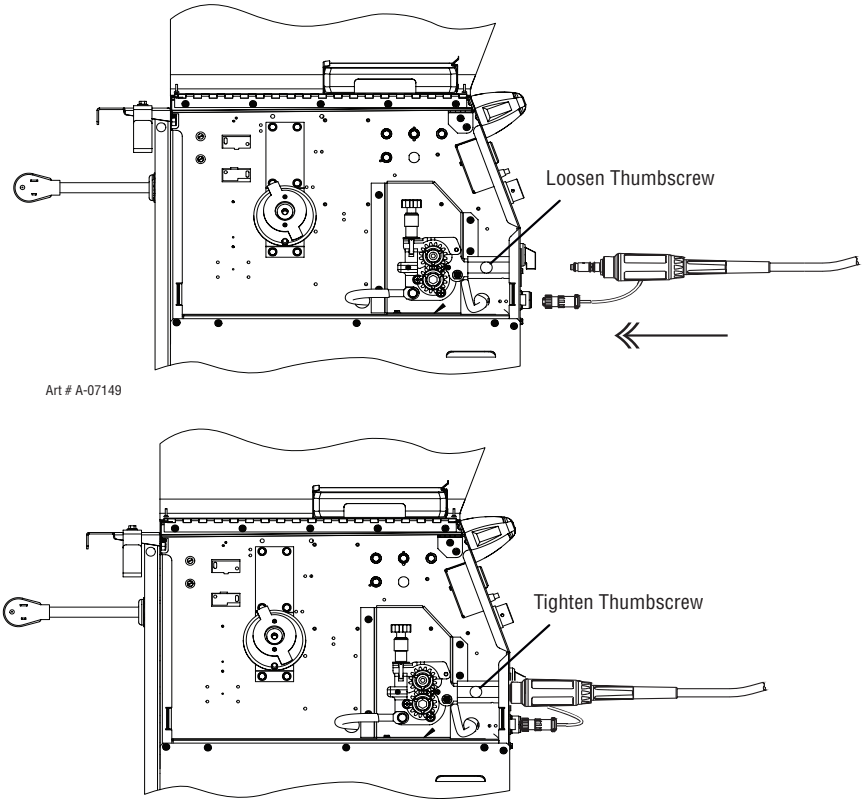


Figure 3-6: Mount Gun Cable to Adapter Socket

3.09 Input And Output Wire Guide Installation

Refer to Figure 3-7.

Install the input wire guide (the longer one) by loosening the input guide lockscrew and inserting the guide into the hole in the feedhead assembly. The recessed end of the guide should be toward the wire spool. Adjust the guide so that it is clear of the feed rolls and tighten the input guide lockscrew.

Install the output wire guide in the same manner, with the conical end toward the feed rolls. The tip of the conical end should be as close to the feed rolls as practical. Tighten the output guide lockscrew.

NOTE

Before tightening the input and output guide lockscrews, install the drive roll to help in the alignment of the wire guides.

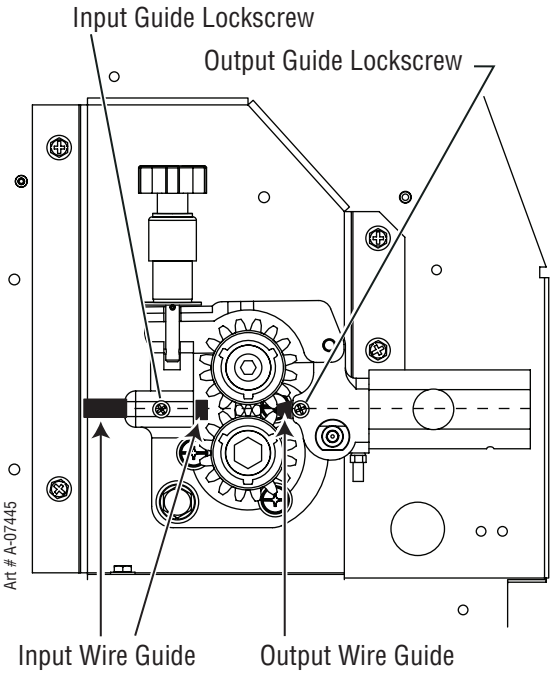


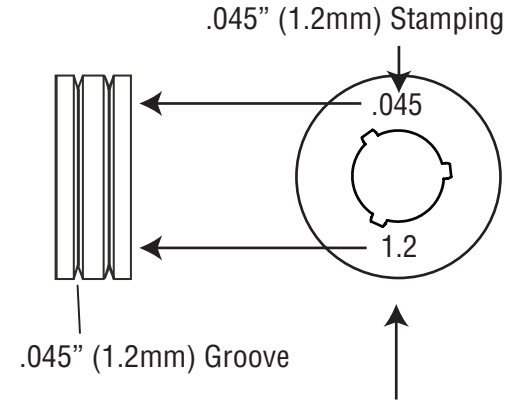
Figure 3-7: Wire Guide Installation

3.10 Selection and Installation of Feedrolls

A Feedroll consists of two different sized grooves. As delivered from the factory the drive roll is installed for .035" / .045" .

The stamped marking on the feedroll refers to the groove furthest from the stamped marking. When mounted, that will be the groove closest to the motor and the one to thread.

To ensure proper wire feed, the groove closest to the motor must match the electrode wire size being used.



The size that is visible when fitting the feedroll is the groove size in use.

Figure 3-8: Feedroll Example

NOTE

All grooved feed rolls have their wire size or range stamped on the side of the roll. On rolls with different size grooves, the outer (visible when installed) stamped wire size indicates the groove in use.

Refer to feed roll kit #375980 in the Appendix for the proper selection and ordering of feed roll kits. Kit includes drive rolls, an input wire guide and an output wire guide for a specific wire type and size.

Feed rolls are removed by twisting the feed roll retainer cap and aligning the retaining knob splines/tabs with the drive gear splines. Feedrolls are installed by putting the feedroll onto the drive gear splines and twisting the feedroll retainer cap so that the splines/tabs rest against the face of the feedroll where they will click into place.

NOTE

Installation of all styles of feed rolls for the Fabricator 251 are identical.

WARNING

The welding wire is electrically Hot if it is fed by depressing gun switch. Electrode contact to work piece will cause an arc with gun switch depressed.

3.11 Installing Wire Spool

As delivered from the factory, the unit is set for a 33/44 lb. or 12" (300mm) spool.

Installation of wire spool

1. Remove Wire Spool Hub Nut by turning counter clock wise (to the left).
2. Remove the spring from the hub.
3. Place Wire Spool onto the hub, loading it so that the wire will feed off the bottom of the spool as the spool rotates counter clockwise. Make sure to align the spool alignment pin on the hub with the mating hole in the wire spool.
4. If using a 10 lb. wire spool place the spring on the exposed hub. Do not use the spring for larger wire spools that cover the entire hub.
5. Replace the Wire Spool Hub Nut by turning clock wise (to the right).

NOTE

The Hub tension has been pre-adjusted at the factory. However if adjustment is required, refer to section 3.14 and Figure 3-12.

CAUTION

Use care in handling the spooled wire as it will tend to "unravel" when loosened from the spool. Grasp the end of the wire firmly and don't let go of it.

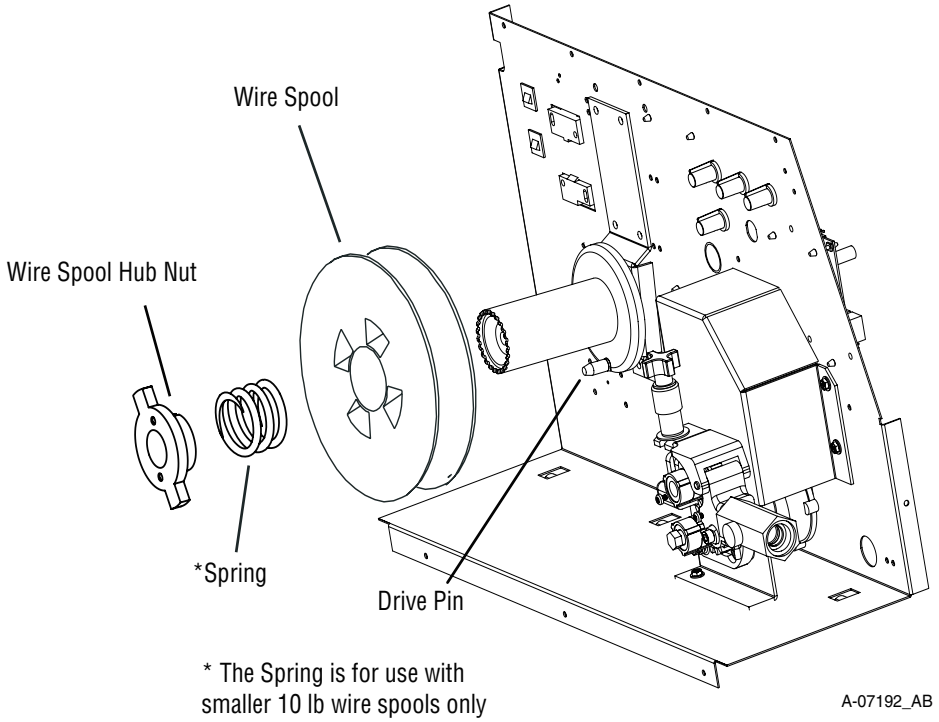


Figure 3-9: Spool Installation

3.12 Inserting Wire into the Feedhead

WARNING

ELECTRIC SHOCK CAN KILL! Make certain the input power is disconnected from the power supply before proceeding. Do not reattach the input power until told to do so in these instructions.

1. Loosen the Spring Pressure Adjusting Knob if needed and swing it down (First part of Figure. 3-10)
2. Move the Pressure (top) Roller Arm by swinging it to the right. (Second part of Figure. 3-10)
3. Make sure the end of the wire is free of any burrs and is straight. Pass the end of wire through the Inlet Wire Guide and over the Feedroll. Make certain the proper groove is being used. (Second part of Figure. 3-10)
4. Pass the wire through the outlet guide and into the Gun liner of the Gun Cable. (Second part of Figure. 3-10)
5. Close the Pressure Roller Arm. (Figure. 3-11)
6. Swing the Spring Pressure Adjusting Knob back into place. (Figure. 3-11)
7. Use the Spring Pressure Adjusting Knob to create a “snug” condition. (Clockwise to tighten and Counter Clockwise to loosen). (Figure. 3-11)
8. Figure 3-12 shows the result with wire installed. Continue to the next section for proper setting of tension.

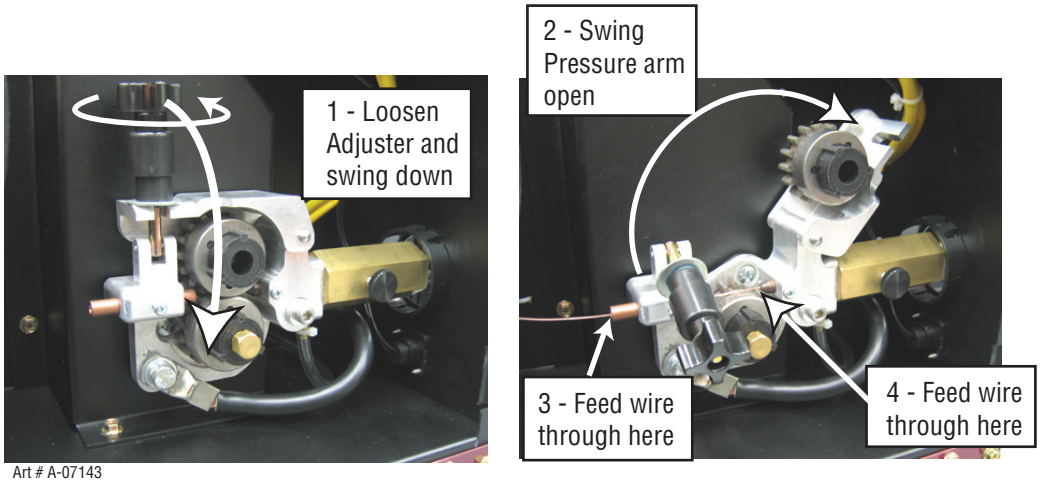


Figure 3-10: Opening Pressure Arm and Inserting Wire

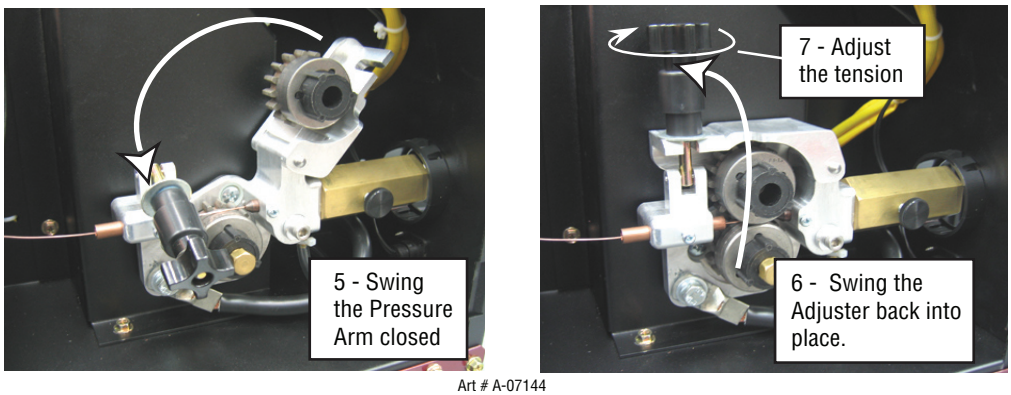


Figure 3-11: Closing Pressure Arm and Adjusting Tension

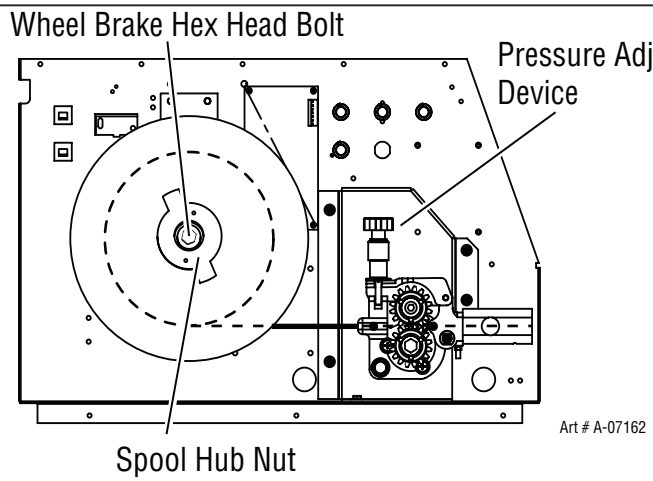


Figure 3-12: Wire Installed

3.13 Wirefeeder Feed Roll Pressure Adjustment

The idler roll on the swing arm applies pressure to the grooved drive roll via an adjustable tension devise. The Pressure Adjustment Device should be set to a minimum pressure that will provide satisfactory wire feed without slippage. If slipping occurs, and inspection of the wire out of the MIG gun reveals no deformation or wear, the conduit liner should be checked for kinks or clogging from metal flakes. If this is not the cause of slipping, the feedroll pressure can be increased by rotating the Pressure Adjustment Device knob clockwise. The use of excessive pressure may cause rapid wear of the feed roller, motor shaft and motor bearings.

NOTE

Genuine TWECO contact tips and liners should be used. Many non-genuine liners use inferior materials which can cause wire feed problems.

3.14 Wire Spool Hub Brake

The wire spool hub incorporates a friction brake which is adjusted during manufacture for optimum braking. If it is considered necessary, adjustment can be made by turning the hex head bolt inside the open end of the wire spool hub. Clockwise rotation will tighten the brake. (Refer to Figure 3-12 above).

CAUTION

Excessive tension on the brake will cause rapid wear of mechanical wire feed parts, over heating of electrical components and possibly an increased incidence of wire Burnback into the contact tip.

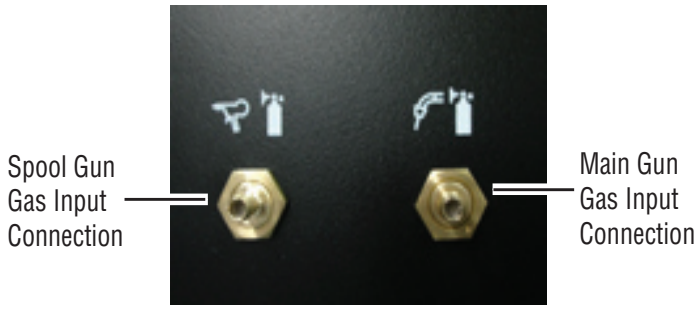
NOTE

Correct adjustment will result in the wire spool circumference continuing no further than 0.75" (20mm) after release of the Gun trigger switch. The wire should be slack without becoming dislodged from the reel.

3.15 Spool Gun Attachment

A spool gun can readily be used with the Fabricator 251 power supply.

1. Attach appropriate input gas to the Spool Gun input gas connection on the rear of the unit. (Refer to Figure. 3-13)
2. Attach the Spool Gun control cable and gas hose to the 10 pin socket and the Spool Gun Gas Outlet on the front of the unit. (Refer to Figure. 3-13)



Rear Panel

Figure 3-13 Spool Gun Connections

NOTE

When the SPOOL GUN is properly attached and the trigger is depressed, the system automatically disables the internal wire feed and gas controls and selects the SPOOL GUN feeder and gas control.

3.16 Polarity Changeover

WARNING

ELECTRIC SHOCK CAN KILL! Make certain the input power is disconnected from the power supply before proceeding. Do not reattach the input power until told to do so in these instructions.

The output terminals are located on the front panel of the welding power source.

CABLE TO GUN, CABLE TO WORK

PROCESS	POLARITY	CABLE CONNECTIONS	
		CABLE TO A2281	CABLE TO WORK
1. GMAW* – Steel, Stainless Steel, Aluminum & gas shielded Flux Cored electrode wires	1. D.C. Electrode Positive (DCEP) – Reverse Polarity	1. Connected to (+) Pos. output terminal	1. Connected to (-) Neg. output terminal
2. FCAW* – Gasless Flux Cored electrode wire	2. D.C. Electrode Negative (DCEN) – Straight Polarity	2. Connected to (-) Neg. output terminal	2. Connected to (+) Pos. output terminal
* Exception - Contact your filler metal supplier for the recommended polarity.			

Table 3-3: Process Cable Connections

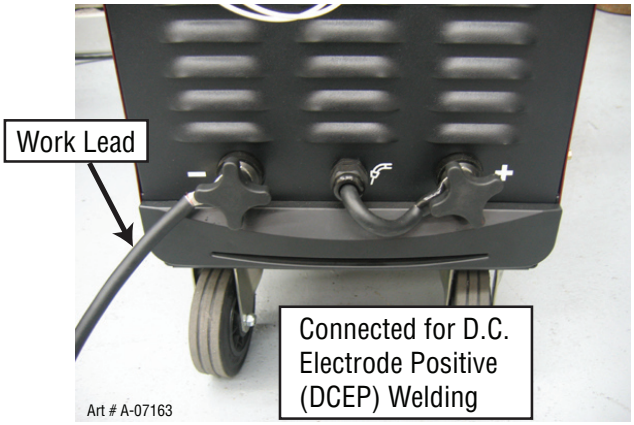


Figure 3-14: Polarity Connections for DCEP

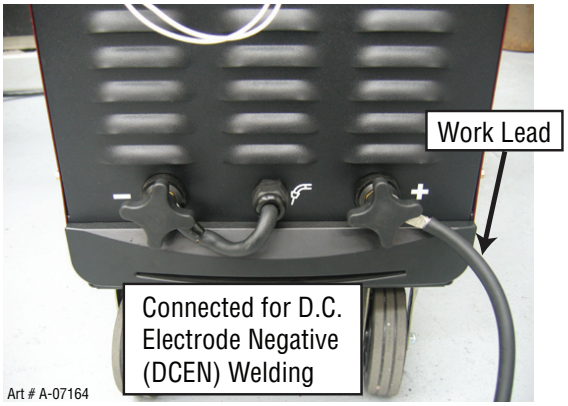


Figure 3-15: Polarity Connections for DCEN

Changing polarity process.

a. Locate the two terminal knobs at the front of the machine. Refer to Figures 3-14 and 3-15.
b. Remove both terminal knobs by rotating counterclockwise.
c. Set up the desired lead polarity as per Table 3-3 and as shown in Figures 3-14 or 3-15.
d. Place the Work Lead cable on the opposite terminal.
e. Replace both terminal knobs and tightly secure them to ensure good electrical connections.

CAUTION

Ensure terminal knobs are tightly secured and that there is no connection between positive and negative terminals.

f. Reconnect the input power to the power supply.

NOTES:

SECTION 4:
OPERATION

WARNING

DO NOT TOUCH the electrode wire while it is being fed through the system. The electrode wire will be at welding voltage potential.

4.01 Power Supply Controls, Indicators and Features

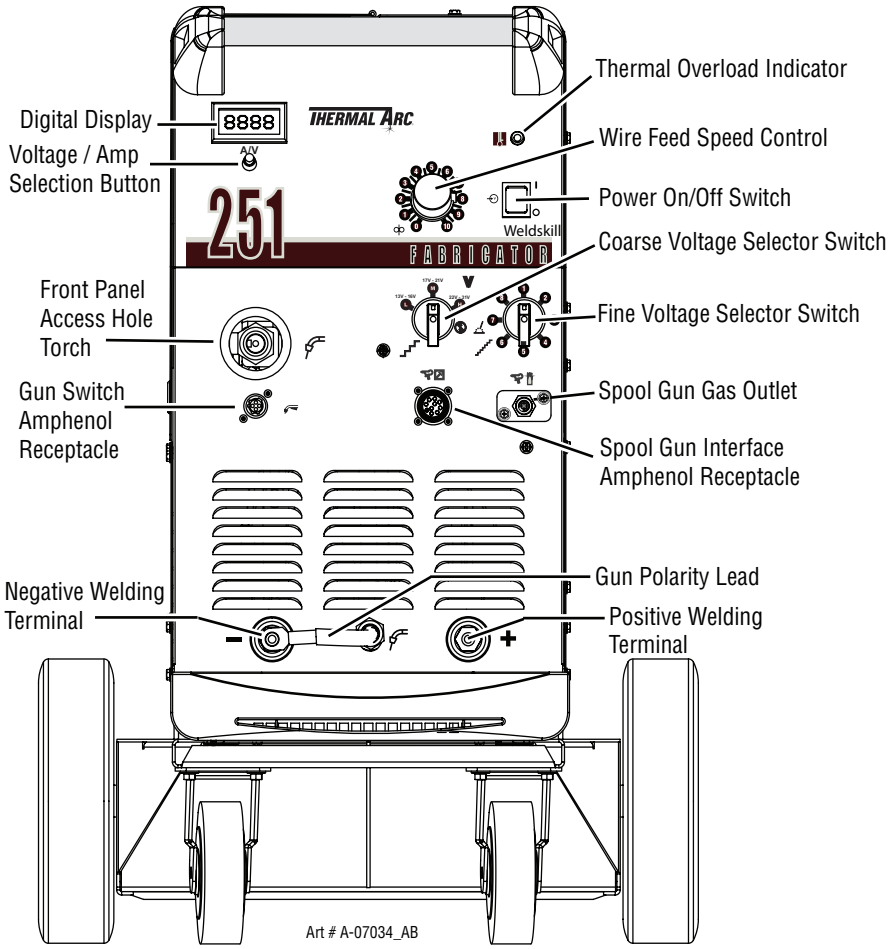


Figure 4-1: Fabricator Controls

On / Standby Power Switch

The indicator light is provided to indicate when the Fabricator 251 is connected to the Primary Input Power Supply Voltage.

With the On/Off Switch in the Off position, the auxiliary power and the fan are turned off and the switch is illuminated.

WARNING

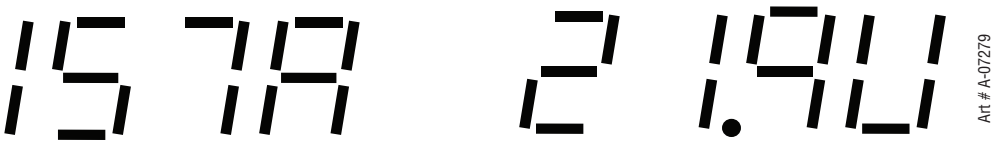
When the light is lit, the machine is connected to the Primary supply voltage and the internal electrical components are at Mains voltage potential.

Digital Display

The Digital Display allows for accurate monitoring (5% tolerance) of welding current and voltage to facilitate precise welding condition adjustments.

Value displayed for 157 Amp

Value displayed for 21.9 Volts



Art # A-07279

Figure 4-2: Digital Display

The Digital Meter will display both welding current or arc voltage. To toggle between the current and voltage readings depress the push button switch mounted below the meter display.

The Digital Meter will hold the last reading at completion of welding for 10 seconds to allow for easy operator set up.

Digital AMP Reading to IPM Conversion

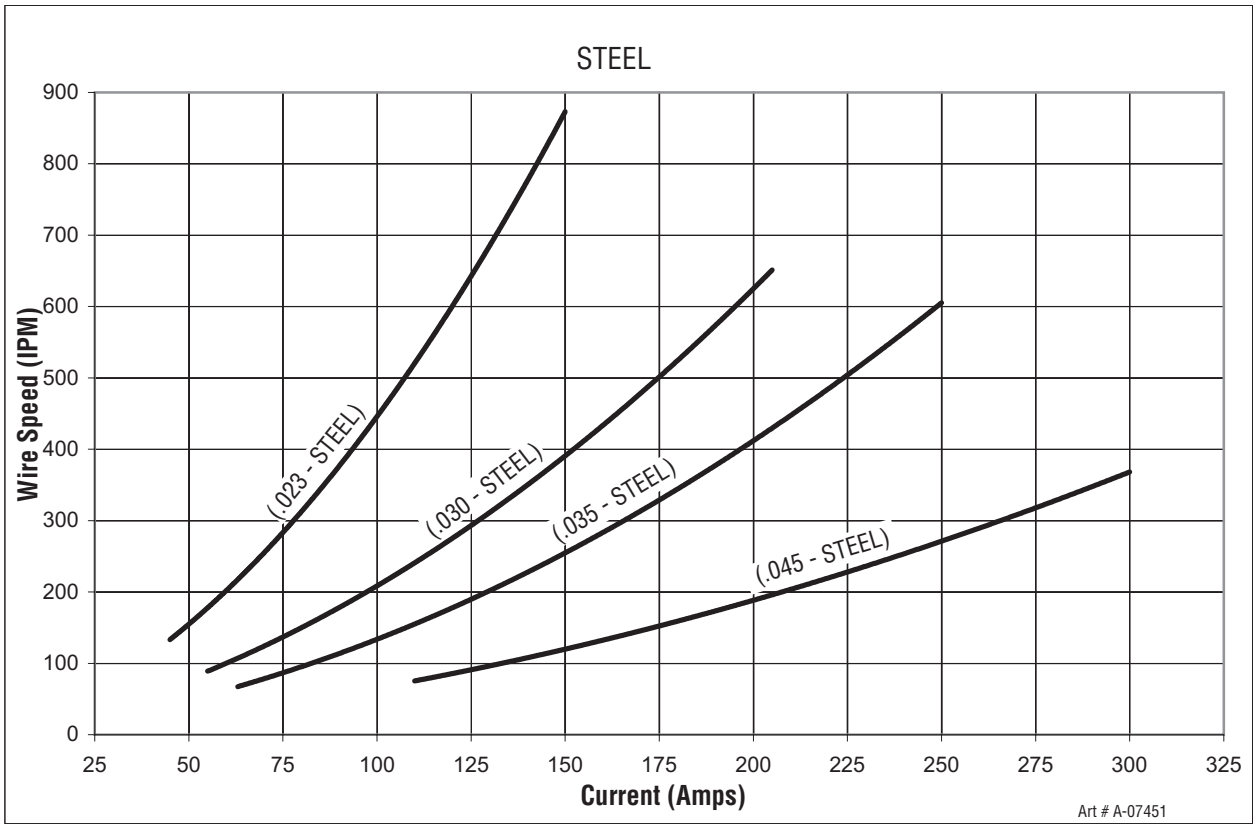


Figure 4-3: Steel - AMP to IPM Conversion

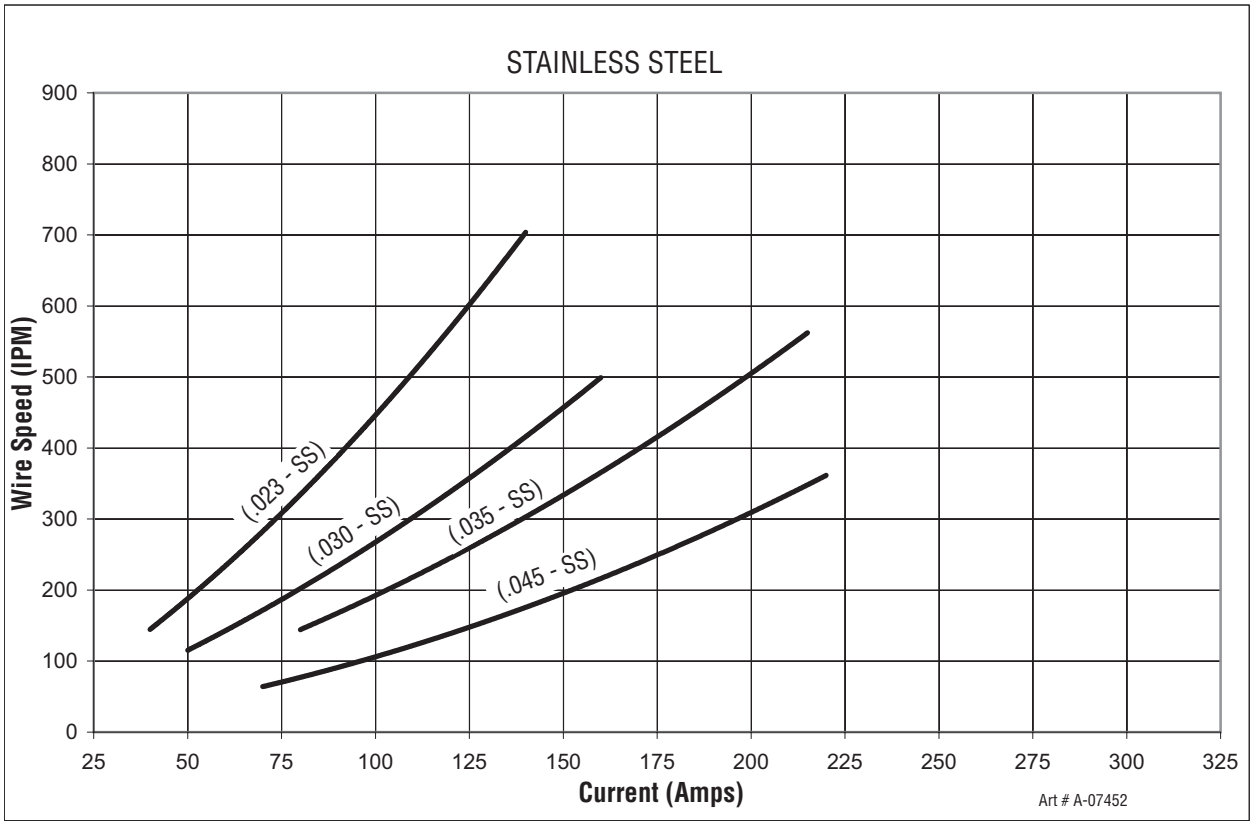


Figure 4-4: Stainless Steel - AMP to IPM Conversion

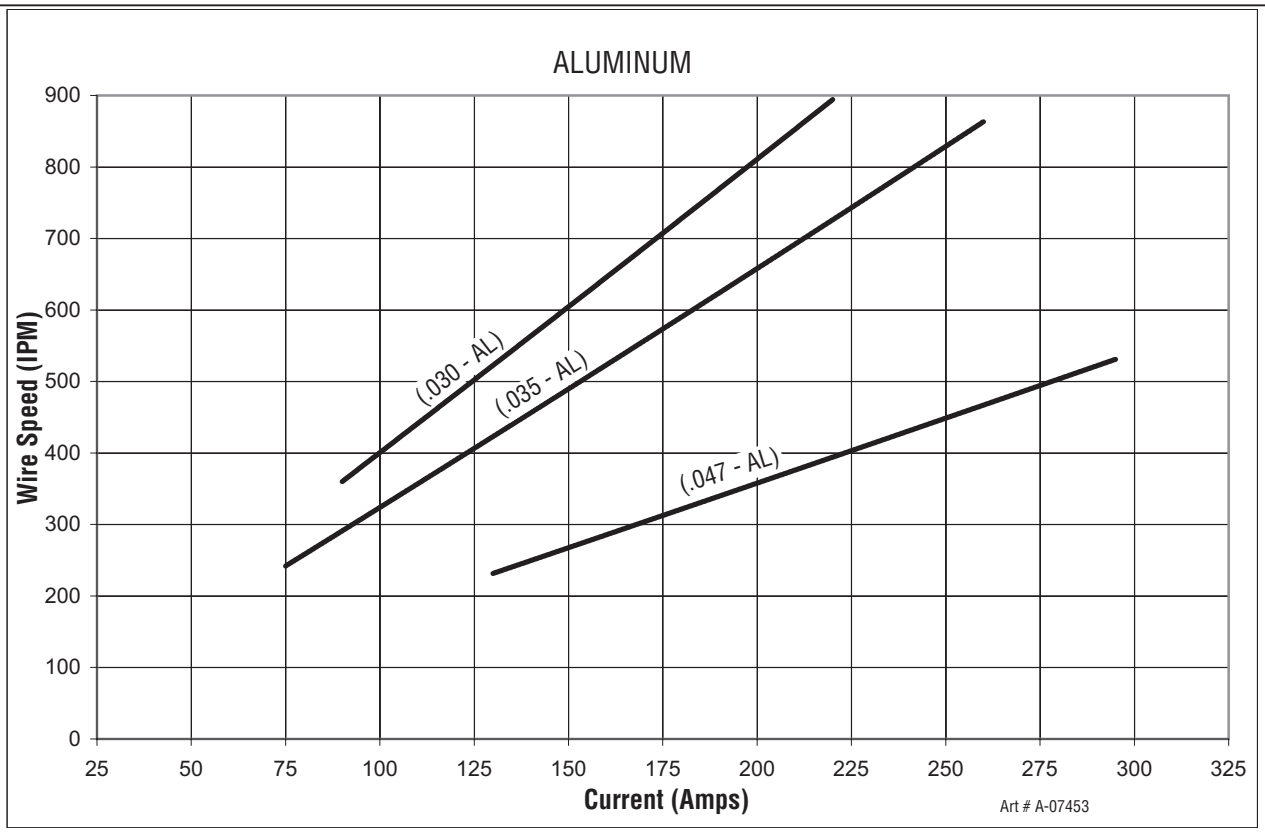


Figure 4-5: Aluminum - AMP to IPM Conversion

Thermal Overload

The critical components for thermal protection are the rectifier stack and the transformer, which are fitted with thermal overload cut out devices. If the overload is activated then the machine should be left to cool for approximately 15 minutes before resuming welding. If the Power Source is operated within its duty cycle, the thermal overload will not activate. Refer to section 2.09 for an explanation of duty cycle and section 2.10 for the power supply specifications.

Wirespeed Control

The Wirespeed Control varies the wirespeed 80 - 800 ipm (2 - 20 m/min), i.e. the speed of the wire feed motor.

Coarse Voltage Control Switch

The Coarse Voltage Control sets the voltage level to the welding terminals as it is rotated from L to H. Clock wise to increase.

Fine Voltage Control Switch

The Fine Voltage Control switch increases the voltage (in smaller increments than the Coarse switch) as it is rotated from position 1 to 8. Clock wise to increase.

CAUTION

The Coarse & Fine Voltage Control switches MUST NOT BE SWITCHED during the welding process.

Positive and Negative Welding Current Terminals

Refer back to Figure 4-1. Both terminals located at the bottom of the unit are shown without the terminal knob. Both knobs must be firmly secured before attempting to weld.

Gun Polarity Lead

This lead selects the welding voltage polarity of the electrode wire. Attach it to the positive welding terminal (+) when using steel, stainless steel or aluminium electrode wire . Attach the Gun Polarity Lead to the negative welding terminal (-) when using gasless flux cored electrode wire. If in doubt, consult the manufacturer of the electrode wire for the correct polarity. Also refer to section 3-16.

Positive and Negative Welding Terminal Knobs

Welding current flows from the Power Supply via heavy duty terminals. It is essential, that these terminal knobs are tight to achieve the necessary electrical connection.

CAUTION

Loose welding terminal connections can cause overheating and result in failure of the terminals.

Gun Switch Receptacle

The Torch Trigger 4-pin receptacle is used to connect the two wires from the torch gun to the Fabricator 251. Only pins 1 and 2 are used for this.

To make connections, align keyway, insert plug, and rotate threaded collar fully clockwise.

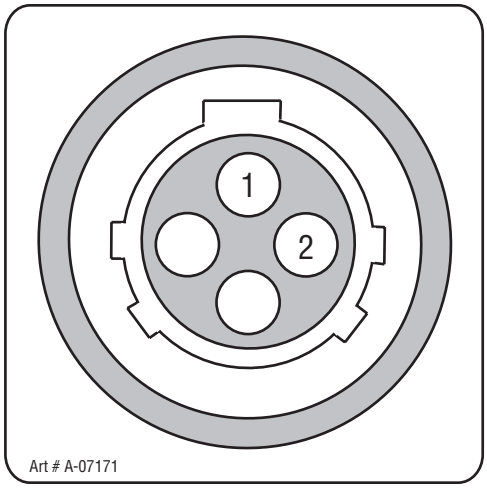


Figure 4-3: Gun Switch Receptacle

Spool Gun Interface Amphenol Connector

The Spool Gun Interface 10 pin connector is used to connect a spool gun to the Fabricator 251 (refer to Figure 4-4 and Table 4-1).

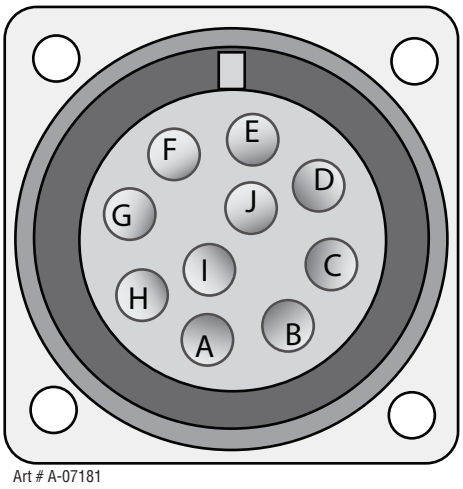


Figure 4-4: Spool Gun 10 pin Receptacle

To make connections, align keyway, insert plug, and rotate threaded collar fully clockwise. The socket information is included in the event the supplied cable is not suitable and it is necessary to wire a plug or cable to interface with the SPOOL GUN 10-pin receptacle.

Socket Pin	Function
A	Not Used
B	Spool Gun Motor (-)
C	Spool Gun Motor (+)
D	Spool Gun Switch
E	Spool Gun Speed C.W. Potentiometer
F	Spool Gun Speed Wiper Potentiometer
G	Spool Gun Switch
H	Spool Gun Speed C.C.W. Potentiometer
I	Not Used
J	Not Used

Table 4-1: 10-pin Receptacle Pin Functions

NOTE

When the SPOOL GUN is properly attached and the trigger is depressed, the system automatically disables the internal wire feed and gas control and selects the SPOOL GUN feeder and gas control.

4.02 Weld Mode Selector

The Weld Mode Selector switch selects the method of welding mode.

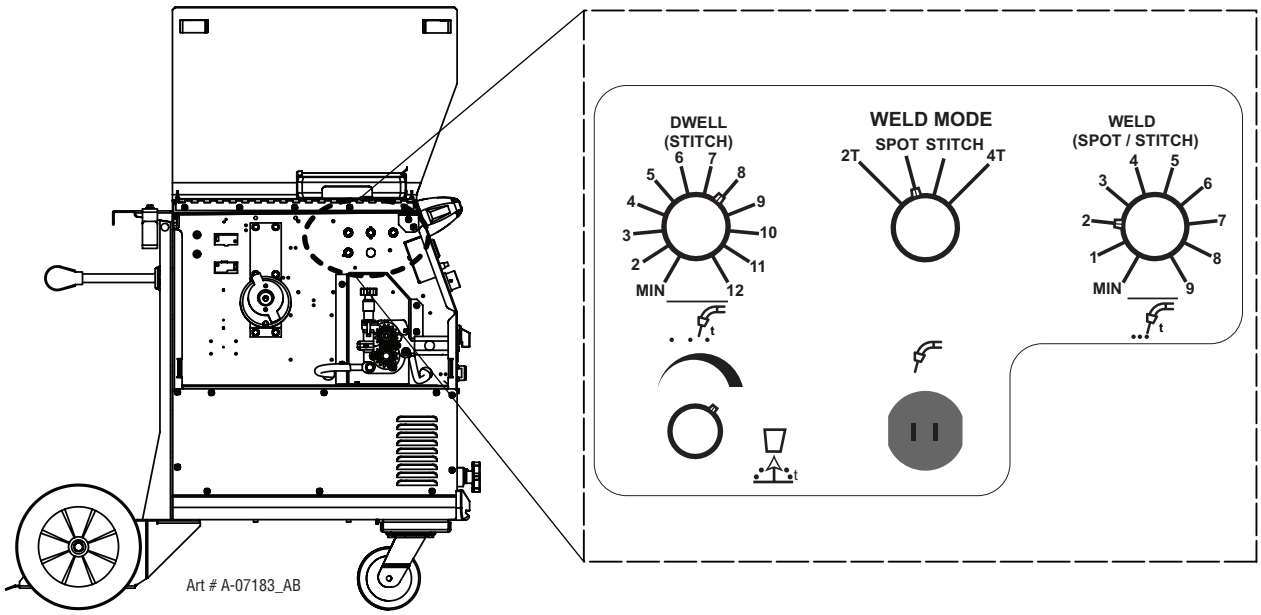


Figure 4-5: Internal Welding Controls

2T (Continuous Welding):

This mode of welding is used to weld two or more components together with a continuous weld. When the MIG gun trigger switch is depressed welding commences. When the MIG gun trigger switch is released welding ceases.

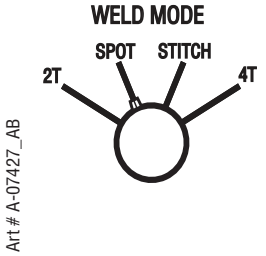


Figure 4-6: For Reference only

SPOT:

This mode of welding is used to weld two plates together at a desired location by melting the top & bottom plates together to form a nugget between them. The spot time period is set by the Weld (Spot/ Stitch) control knob located in the electrode wire compartment. (Refer to Figure 4-6 for control).

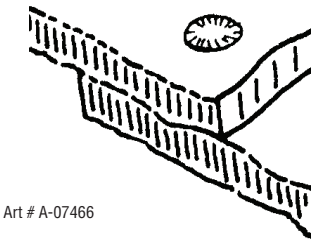


Figure 4-7: Spot Weld

NOTE

A spot nozzle should be used on the MIG gun to obtain consistent spot welds.

STITCH:

This mode of welding is used to weld two or more components together with a stitch weld. The WELD (Spot/Stitch) shaft controls the welding or 'ON' time and the "DWELL (Stitch)" shaft controls the interval or 'OFF' time for stitch welding. (Refer to Figure 4-6 for control).

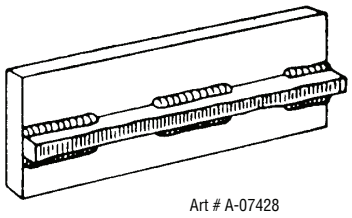


Figure 4-8: Stitch Welding

4T (Latch):

This mode of welding is mainly used for long weld runs, as the operator need only press the trigger to activate the weld, then press the trigger again to stop. This replaces the need for the operator to depress and hold the trigger for the complete length of the weld run.

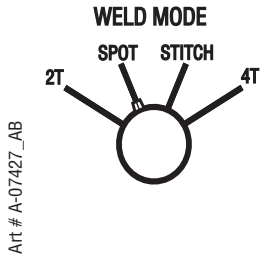


Figure 4-9: For Reference only

WELD (Spot/Stitch) ,MODE SELECTOR

WELD MODE - SPOT

When the Weld Mode control is in the Spot position, the Weld (Spot/Stitch) timer controls the duration of a single spot weld.

WELD MODE - STITCH

When the Weld Mode control is in the Stitch position, the Weld (Spot/Stitch) timer controls the length of the stitch weld on time when wire feeds.

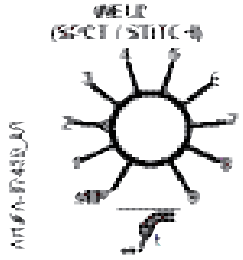


Figure 4-10: Weld (Spot/Stitch) Timer Control

DWELL STITCH TIMER CONTROL

DWELL (STITCH) CONTROL KNOB

When the Weld Mode control is in the Stitch position, the Dwell (Stitch) timer controls the length of the non-weld portion of stitch welding off time when wire stops feeding.

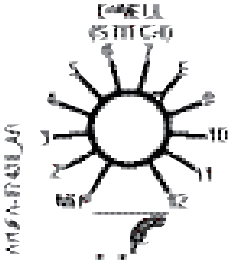


Figure 4-11: Dwell (Stitch) Timer Control

Burnback Control

Burnback time is the difference between the wirefeed motor stopping and the welding current ceasing. The Burnback time allows the electrode wire to burn out of the molten metal weld pool. The Burnback time is factory set for optimum performance. Burnback time is adjusted by the knob of the potentiometer. Clockwise adjustment increases Burnback time.

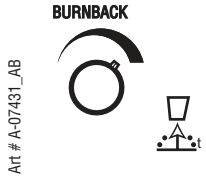


Figure 4-12: Burnback Control

4.03 TWECO Weldskill 300 AMP Weld Gun

The TWECO Weldskill 300 AMP gun fitted to the FABRICATOR 251 offers robust construction, unparalleled reliability and easy replacement of consumable parts. The TWECO Weldskill gun has an operating capacity in excess of the capacity of the FABRICATOR and can be expected to give trouble free service.

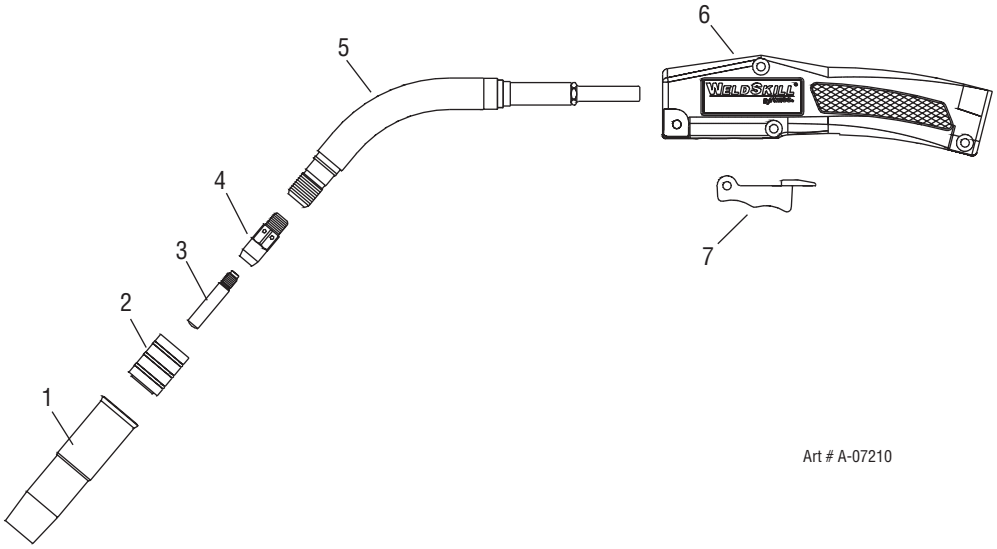


Figure 4-13: TWECO WeldSkill 300 AMP

Original Parts Installed			
Item	Description	Part No.	Qty
1	NOZZLE	24A-62	1
2	NOZZLE INSULATOR	34	1
3	CONTACT TIP	14-35	1
4	GAS DIFFUSER	54A	1
5	CONDUCTOR TUBE	WM63J-50	1
6	HANDLE ASSY	TA1-80	1
7	TRIGGER SWITCH	WM91	1

Table 4-2 MIG Gun Original Parts Consumables

TWECO Weldskill MIG guns may be fitted to many different types of MIG welding Power Supplies so that your whole shop can be converted to TWECO Weldskill. Not only will this give greater reliability (and hence greater productivity) but it will reduce stockholding of consumable parts. See your Thermal Arc distributor for details.

Gun Consumable Parts

See Appendix at the back of this manual.

4.04 Installing A New Wire Conduit

1. Be sure the MIG gun cable is arranged in a straight line, free from twists, when installing or removing a wire conduit. Remove the old conduit by first removing the MIG gun nozzle, contact tip, insulator and gas diffuser. Then loosen Allen screws in the conductor tube and connector plug and pull the old wire conduit out of the cable assembly from the connector plug end.
2. To install a new conduit, first inspect the o-ring gas seal on the conduit for cuts or damage. Start from the connector plug end of the assembly and begin pushing the conduit through the connector plug, cable assembly and into the gun. If the conduit should lodge along the way, gently whip or work the cable assembly to aid forward movement.

   When the conduit stop meets the end of the connector plug and the new raw end extends through the end of the conductor tube on the welding gun, tighten the Allen screw in the connector plug onto the conduit to prevent its backward movement.

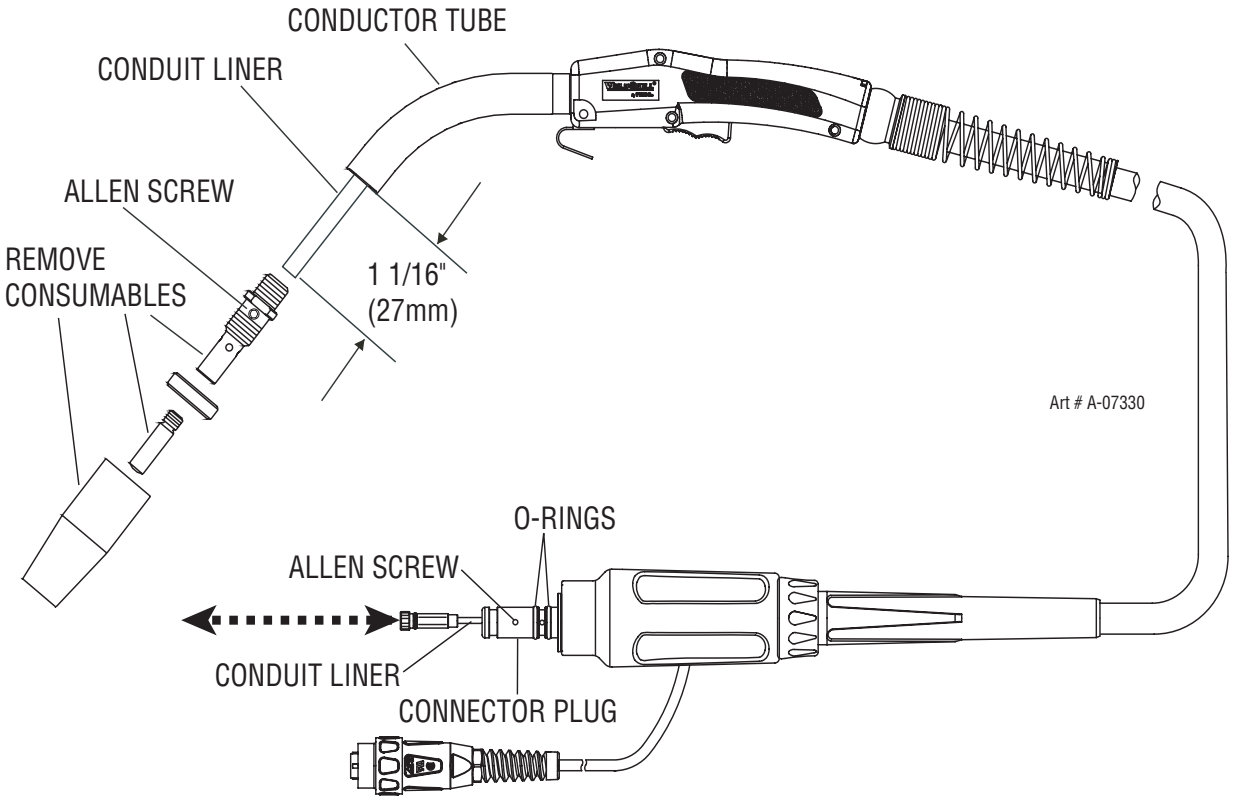


Figure 4-14: Conduit Trim Length

NOTE

When the conduit is fully inserted into the cable assembly and the conduit stop is firmly against the Connector Plug, the "raw end" of the conduit will protrude out of the open end of the gun conductor tube. Trim the conduit as shown in Figure 4-14. The trimmed end which seats in the Gas Diffuser must be filed and reamed smooth on the inside and outside radii so wire feed will not be obstructed.

3. Replace Gas Diffuser, Contact Tip, Insulator and Nozzle.
4. Tighten the Allen screw in the conductor tube.

CAUTION

Do not over tighten the conductor tube screw as this action will result in the distortion of the conduit and will lead to wire feed problems.

4.05 MIG Gun Maintenance

Remove dust and metallic particles from the gun conduit by forcing clean, dry compressed air into the conduit once a week. This will minimize wire feeding problems.

4.06 Basic Welding Technique

Setting of the Power Supply

The setting of the Fabricator 251 requires some practice by the operator, the welding Power Supply having two control settings that have to balance. These are the Wire Speed control and the Voltage Control switches. The welding current is determined by the Wire Speed control, the current will increase with increased Wire Speed, resulting in a shorter arc. Less wire speed will reduce the current and lengthen the arc. Increasing the welding voltage hardly alters the welding current level, but lengthens the arc. By decreasing the voltage, a shorter arc is obtained with little change in welding current.

When changing to a different electrode wire diameter, different control settings are required. A thinner electrode wire needs more Wire Speed to achieve the same current level.

A satisfactory weld cannot be obtained if the wire speed and voltage switch settings are not adjusted to suit the electrode wire diameter and dimensions of the work piece.

If the Wire Speed is too high for the welding voltage, “stubbing” will occur as the wire dips into the molten pool and does not melt. Welding in these conditions normally produces a poor weld due to lack of fusion. If, however, the welding voltage is too high, large drops will form on the end of the electrode wire, causing spatter. The correct setting of voltage and Wire Speed can be seen in the shape of the weld deposit and heard by a smooth regular arc sound.

MIG Gun Travel Speed

Speed at which a weld travels influences the width of the weld and penetration of the welding run.

Position of MIG gun

The angle of MIG gun to the weld has an effect on the width of the weld run. Refer to Figure 4-15.

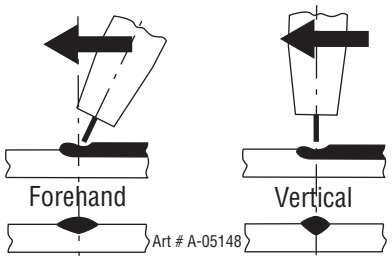


Figure 4-15: MIG Gun Angle

Distance from the MIG Gun Nozzle to the Work Piece

The electrode stick out from the MIG gun nozzle should be between 5/64" (2.0mm) to 13/64" (5.0mm). This distance may vary depending on the type of joint that is being welded.

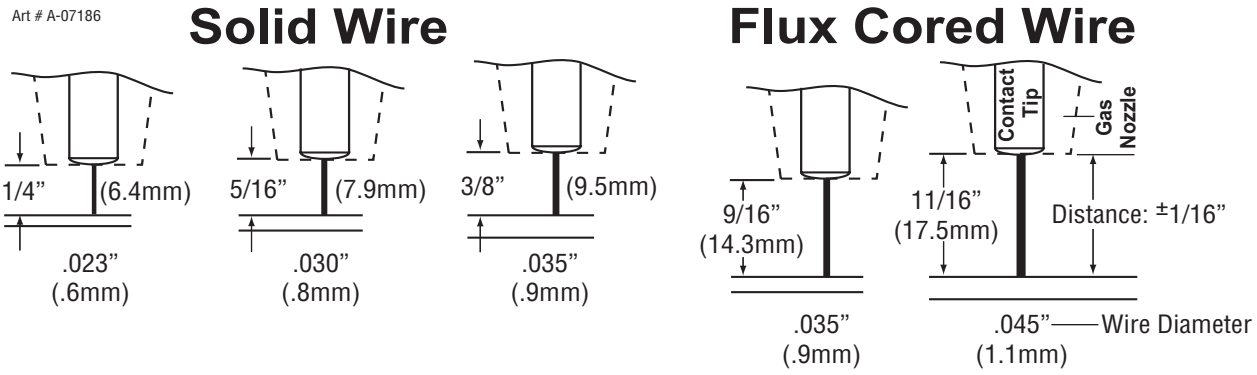


Figure 4-16: Optimum Contact Tip to Work Distances

Electrode Wire Size Selection

The choice of electrode wire size in conjunction with shielding gas used depends on:

- Thickness of the metal to be welded,
- Type of joint,
- Capacity of the wire feed unit and power supply,
- The amount of penetration required,
- The deposition rate required,
- The bead profile desired,
- The position of welding and
- Cost of the electrode wire.

Weld metal deposition rate is proportional to current density. Current density is defined as the current per cross sectional area of the electrode wire and is normally expressed as amps per mm^2. An example is in Table 4-3 below.

Electrode Wire Size	Current (Amps)	Current Density(Amps/mm2)	Deposition Rate(lbs/hour)
.035"(0.9mm)	200	314	7.0
.045"(1.2mm)	200	177	6.2

Table 4-3: .035" (0.9mm) , .045"(1.2mm) Wire Deposition Rate

Advantages of MIG welding forehand:

- Allows superior visibility of the weld zone
- Flatter weld bead
- Shallower penetration

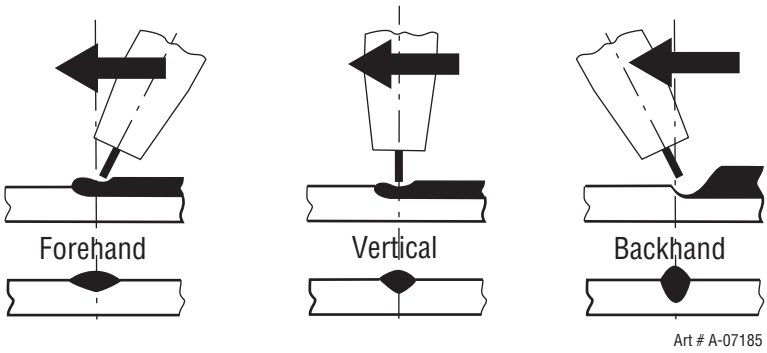


Figure 4-17: MIG Gun Angle

4.07 Stitch Welding Operation

Welding consumable costs can be reduced by replacing a continuous weld bead with the Stitch weld bead. It will also reduce heat distortion in thin plate.

Coarse & Fine Voltage Selector Switches and Wire Speed Control

Set these controls to obtain the desired welding conditions for the wire and material being welded.

Mode Selector Switch

Set the WELD MODE switch to STITCH.

WELD (Spot/Stitch) Time

Adjust the WELD (Spot/Stitch) timer control knob for the desired weld or 'ON' time while stitch welding.

Dwell Time

Adjust the DWELL (Stitch) timer control knob for the desired interval or 'OFF' time while stitch welding.

4.08 Spot Welding Operation

Fit an optional spot welding nozzle to the MIG gun for consistent spot welding operations. Refer to the spot welding nozzle table below. The Fabricator 251 will operate effectively using .030" (0.8mm) electrode wire when spot welding. Penetration depth is limited when using .024"(0.6mm) electrode wire for spot welding. Set the controls as follows for spot welding:

Coarse & Fine Voltage Selector Switches and Wirespeed Control

Select higher Voltage Selector switch positions and set the Wirespeed Control between 354 to 590 ipm (9 to 15 m/min) for maximum penetration.

Mode Selector Switch

Set the WELD MODE selector switch to SPOT.

Spot Time

Adjust the WELD (Spot/Stitch) timer control knob for the desired weld or 'ON' time for spot welding.

Dwell Time

The *DWELL (Stitch)* timer control knob has no affect in this mode of operation.

SPOT WELDING NOZZLES

TYPE	NO.4 400 AMP
Flat Arc Spot	24A-62-FAS 1240-1520 (5/8" Bore)
	24A-75-FAS 1240-1530 (3/4" Bore)
	24A-100-FAS 1240-1550 (1" Bore)
Inside Corner Arc Spot	24A-75-IAS 1240-1531 (3/4" Bore)
Outside Corner Arc Spot	24A-75-IAS 1240-1532 (3/4" Bore)
Automotive Stud Nozzle	N/A

4.09 Gas Selection for Gas Metal Arc Welding

Metal Type	Base Plate Thickness	Filler Metal	Transfer Mode	Suggested Shielding Gas	Welding Positions	Comments
Carbon Steel	Greater than 22 gauge (.030")	ER70S-X	Short Circuit	100% CO_2	All Position Welding	High welding speeds. Good penetration and pool control.
	Greater than 22 gauge (.030")	ER70S-X	Short Circuit	75% Argon 25% CO2	All Position Welding	Suitable for high-current and high-speed welding.
	Greater than 22 gauge (.030")	ER70S-X	Short Circuit	92% Argon 8% CO2	All Position Welding	Higher deposition rates without melt-through. Minimum distortion and spatter. Good pool control for out-of-position welding.
	Greater than 10 gauge (1/8")	ER70S-X	Spray Transfer	92% Argon 8% CO2 or minimum 80% Argon 20% O2	Flat & HV Fillet	Good arc stability, weld soundness, and increasing width of fusion.
Low Alloy and High Alloy Steel	Greater than 22 gauge (.030")	See * below	Short Circuit Globular	75% Argon 25% CO2	All Position Welding	High welding speeds. Good penetration and pool control. Applicable for out-of-position welds. Suitable for high-current and high-speed welding.
	Greater than 22 gauge (.030")	See * below	Short Circuit	92% Argon 8% CO2	All Position Welding	Good coalescence and bead contour. Good mechanical properties.
	Greater than 3/32"	See * below	Spray transfer	92% Argon 8% CO2 or minimum 80% Argon 20% O2	Flat & HV Fillet	Reduces undercutting. Higher deposition rates and improved bead wetting. Deep penetration and good mechanical properties.
	Greater than 14 gauge (.075")	See * below	Short Circuit	98% Argon 2% CO2	All Position Welding	Good control of melt-through and distortion. Used also for spray arc welding. Pool fluidity sometimes sluggish depending on the base alloy.
Stainless Steel	Greater than 22 gauge (.030")	ER308-X ER309-X ER316-X	Short Circuit	90% Helium 7.5% Argon 2.5% CO2 or 81% Argon 18% Helium 1 % CO2	All Position Welding	Low CO_2 percentages in Helium mix minimizes carbon pickup, which can cause intergranular corrosion with some alloys. Helium improves wetting action and contour. CO_2 percentages above 5% should be used with caution on some alloys.
	Greater than 3/32"	ER308-X ER309-X ER316-X	Spray Transfer	90% Helium 7.5% Argon 2.5% CO2 or 81% Argon 18% Helium 1 % CO2	Flat & HV Fillet	Good arc stability. Produces a fluid but controllable weld pool, good coalescence, and bead contour. Minimizes undercutting on heavier thickness.
Aluminum	Greater than 18 gauge (.045")	ER4043 ER5356	Spray Transfer	Argon	All Position Welding	Excellent cleaning action. Provides more stable arc than helium-rich mixtures.

* Contact your Filler Metal Supplier for recommended filler metal for the base metal to be welded.

Table 4-4: Gas Selection Chart

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4.10 Welding Setting Selection Guide

Material Type	Wire Type	Shielding Gas and Flow Rate	Wire Size (Diameter)
Steel	Solid (or hard) ER70S-6	100% CO_2 25cfh	.035" (0.9mm) .045" (1.2mm)
		75% Ar 25% CO_2 ,25cfh	.023" (0.6mm) .030" (0.8mm) .035" (0.9mm) .045" (1.2mm)
		92% Ar 8% CO_2	.023" (0.6mm) .030" (0.8mm) .035" (0.9mm) .045" (1.2mm)
Steel	Flux Core E71T-1 E71T-GS E71T-11	100% CO_2 25cfh	.045" (1.2mm) 1/16" (1.6mm)
		None	.030" (0.8mm) .035" (0.9mm) .045" (1.2mm) 1/16" (1.6mm)
Aluminum	Aluminum 4043 ER 5183 ER 5356 ER	100% Ar 25cfh	.030" (0.8mm) .035" (0.9mm) .045" (1.2mm)
Stainless Steel	Stainless ER308LSi ER309LSi ER316LSi	7.5% Ar 90% He 2.5% CO_2 35cfh	.030" (0.8mm) .035" (0.9mm)

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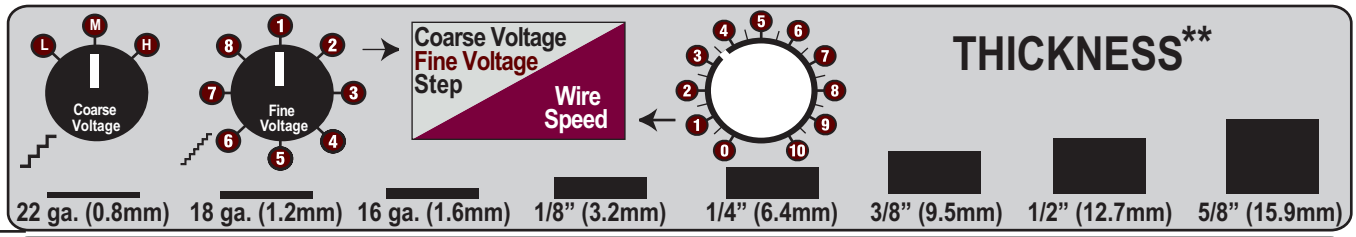
Table 4-5: Welding Selection Guide



— —	M/2 1.5	M/3 1.5	M/4 2	H/1 5	H/3 6	H/4 8.5	H/5 7.25
— —	— —	M/5 1.75	M/7 2	H/2 3.5	H/3 3.5	H/5 4.25	H/7 4.5
L/6 1.5	M/1 2.25	M/1 3	M/4 4.5	— —	— —	— —	— —
L/6 1.5	M/1 2	M/3 3	M/7 4	M/8 5.25	H/1 7	H/3 8.25	— —
— —	M/1 1.5	M/4 2.5	M/5 3.25	M/7 5.75	H/1 6.75	H/3 8	H/4 5.75
— —	— —	L/8 1.5	M/5 2	M/8 3	H/2 4.25	H/4 5	H/5 4.5
L/8 2.25	M/1 2.75	M/2 4.5	M/5 6	H/2 7.75	— —	— —	— —
L/8 1.25	M/2 1.75	M/3 2.5	M/6 4.5	H/3 5.75	H/4 6.5	H/5 7.25	— —
— —	M/1 1.25	M/4 2.5	M/5 3	H/4 5.5	H/5 7	H/7 7.5	— —
— —	— —	L/8 1.5	M/6 2.25	H/4 3	H/5 3.25	H/6 3.5	— —
— —	— —	M/6 2	M/7 2.25	H/1 4	H/4 5.5	H/4 5.5	H/5 7
— —	— —	H/1 1.5	H/2 2	H/4 2.75	— —	— —	— —
— —	L/5 1.5	L/6 1.75	M/2 2.75	M/5 6	M/8 7.5	— —	— —
— —	— —	L/8 2	L/8 2	M/4 3.5	M/6 4.5	M/8 5.5	M/8 5.5
— —	— —	M/1 1	M/4 2	M/7 3.25	M/8 3.75	M/8 3.75	H/4 4.5
— —	— —	— —	M/7 1	H/2 1.5	H/3 2.5	— —	— —
— —	L/8 4.5	M/2 4.25	M/5 5	H/1 7	— —	— —	— —
— —	L/7 3.25	L/8 4	M/5 4.5	H/2 6.75	H/3 7.75	— —	— —
— —	— —	— —	M/6 3	H/2 3.5	H/4 5	H/5 5.75	H/6 6.25
M/2 1.5	M/3 2.5	M/4 3	M/7 5	H/1 6.5	H/6 6	H/7 6.5	— —
— —	M/3 2	M/4 2.5	M/6 3.5	H/1 4.5	H/1 6	H/5 6	H/6 6.5

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NOTES

SECTION 5:
MAINTENANCE & TROUBLESHOOTING

5.01 Routine Maintenance & Inspection

The only routine maintenance required for the Fabricator 251 is a thorough cleaning and inspection, with the frequency depending on the usage and the operating environment.

WARNING

Disconnect the Fabricator from the Input power supply voltage before disassembling.

Special maintenance is not necessary for the control unit parts in the Power Supply. If these parts are damaged for any reason, replacement is recommended.

CAUTION

Do not blow air into the Power Supply during cleaning. Blowing air into the Power Supply can cause metal particles to interfere with sensitive electronic components and cause damage to the Power Supply.

To clean the Power Supply, disconnect it from the mains supply voltage then open the enclosure and use a vacuum cleaner to remove any accumulated dirt and dust. The Power Supply should also be wiped clean. If necessary, solvents that are recommended for cleaning electrical apparatus may be used.

Troubleshooting and repairing the Fabricator should be carried out only by those who are familiar with electrical equipment.

WARNING

Do not attempt to diagnose or repair unless you have had training in electronic measurement and troubleshooting techniques.

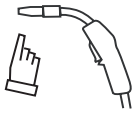
Warning!
Disconnect input power before maintaining.

Maintain more often if used under severe conditions

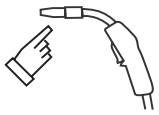
Each Use

Visual check of regulator and pressure

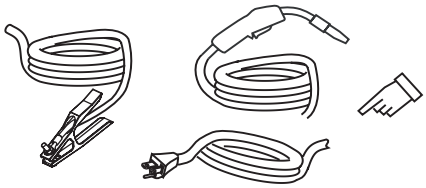
Visual check of torch Consumable parts



Weekly



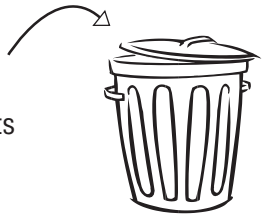
Visually inspect the torch body and consumables



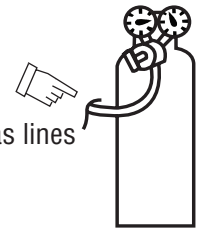
Visually inspect the cables and leads. Replace as needed

3 Months

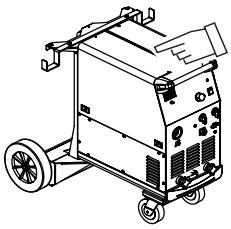
Replace all broken parts



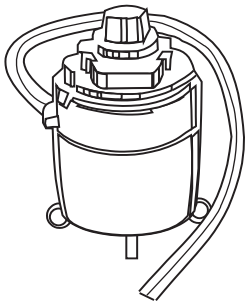
Gas lines



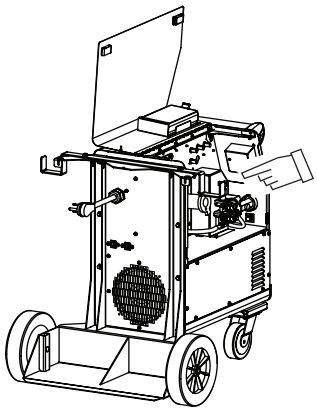
Clean exterior of power supply



6 Months



Visually check and use a vacuum to carefully clean the interior



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SECTION 6:
TROUBLESHOOTING

WARNING

Disconnect the Fabricator from the Input power supply voltage before disassembling.

WARNING

Do not attempt to diagnose or repair unless you have had training in electronic measurement and troubleshooting techniques.

6.01 Basic Troubleshooting

The basic level of troubleshooting is that which can be performed without special equipment or knowledge, and without removing the covers from the Power Supply.

If major components are faulty, then the Power Supply should be returned to an Accredited Thermal Arc Service Agent for repair.

6.02 Solving Problems Beyond the Welding Terminals

The general approach to fix GMAW/FCAW problems is to start at the wire spool then work through to the MIG torch. There are two main areas where problems occur:

Porosity

When there is a gas problem the result is usually porosity within the weld metal. Porosity always stems from some contaminant within the molten weld pool which is in the process of escaping during solidification of the molten metal.

Contaminants range from no gas around the welding arc to dirt on the work piece surface. Porosity can be reduced by checking the following points:

FAULT	CAUSE	REMEDY
Porosity	1. Gas cylinder contents and flow meter	a. Ensure that the gas cylinder is not empty and the flow meter is correctly adjusted to 25CFM (15 litres per minute)
	2. Gas leaks	a. Check for gas leaks between the reulator/flowmeter connection and in the gas hose to the power supply
	3. Internal gas hose in the power supply	a. The hose from the solenoid valve to the MIG torch adaptor may be fractured or disconnected from the MIG torch adaptor. Return to an Accredited Thermal Arc Service Agent for repair.
	4. Welding in a windy environment	a. Shield the weld area from the wind or increase the gas flow
	5. Welding dirty, oily, painted, oxidized or greasy plate.	a. Clean contaminates off the plate
	6. Distance between the MIG torch nozzle and the work piece.	a. Keep the distance between the MIG torch nozzle and the work piece to a minimum.
	7. Maintain the MIG torch in good working order.	a. Ensure that the gas holes are not blocked and gas is exiting out of the torch nozzle. Refer to WARNING below b. Do not restrict gas flow by allowing spatter to build up inside the MIG torch nozzle. C. Check that the MIG gun O-rings are not damaged.

Table 6-1: Porosity Problems

WARNING

Disengage the drive roll when testing for gas flow by ear.

2. Inconsistent wire feed

FAULT	CAUSE	REMEDY
Inconsistent Wire Feeding	1. Wire spool brake is	a. Feed roll driven by motor in the cabinet will slip.
	2. Wire spool brake is	a. Wire spool can unwind and tangle
	3. Worn or incorrect feed roller size.	a. Use 'U' groove drive feed roll matched to the aluminum wire size you are welding. b. Use 'V' groove drive feed roll matched to the steel wire size you are welding. C. Use 'knurled V' groove drive feed roll matched to the flux cored wire size you are welding.
	4. Misalignment of inlet/outlet guides.	a. Wire will rub against the misaligned guides and reduces wire feedability.
	5. Liner blocked with slag.	a. Slag is produced by the wire passing through the feed roller, if excessive pressure is applied to the pressure roller adjuster. Slag can also be produced by the wire passing through an incorrect feed roller groove shape or size. Slag is fed into the liner where it accumulates thus reducing wire feedability.
	6. Incorrect or worn contact tip.	a. The contact tip transfers the weld current to the electrode wire. If the hole in the contact tip is too large then arcing may occur inside the contact tip resulting in the electrode wire jamming in the contact tip. When using soft electrode wire such as aluminum it may become jammed in the contact tip due to expansion of the wire when heated. A contact tip designed for soft electrode wires should be used.
	7. Poor work lead contact to work piece.	a. If the work lead has a poor electrical contact to the work piece then the connection point will heat up and result in a reduction of power at the arc.
	8. Bent liner.	a. This will cause friction between the wire and the liner thus reducing wire feedability

Figure 6-2: Trouble Shooting for Inconsistent Wire Feed

6.03 Welding Problems

FAULT	CAUSE	REMEDY
A. Undercut	1. Welding arc voltage too high.	a. Reduce voltage by reducing the voltage selection switch position or increase the wire feed speed.
	2. Incorrect torch angle	a. Adjust angle
	3. Excessive heat input	a. Increase the torch travel speed and/or reduce welding current by reducing the voltage selection switch position or reducing the wirefeed speed.
	4. Weld speed too fast	a. Reduce weld speed.
B. Lack of penetration	1. Welding current too low	a. Increase welding current by increasing wire feed speed and increasing voltage selection switch position.
	2. Joint preparation too narrow or gap too tight	a. Increase joint angle or gap
	3. Shielding gas incorrect	a. Change to a gas which gives higher penetration
	4. Weld speed too fast	a. Reduce weld speed.
C. Lack of fusion	1. Voltage too low	a. Increase voltage by increasing voltage selection switch position.
	2. Weld speed too fast	a. Reduce weld speed.
D. Excessive spatter	1. Voltage too high	a. Lower voltage by reducing the voltage selection switch or increase wirespeed control.
	2. Voltage too low	a. Raise voltage by increasing the voltage selection switch or reduce wirespeed control.
	3. Weld speed too fast	a. Reduce weld speed.
E. Irregular weld shape	1. Incorrect voltage and current settings. Convex, voltage too low. Concave, voltage too high.	a. Adjust voltage and current by adjusting the voltage selection switch and the wirespeed control.
	2. Wire is wandering	a. Replace contact tip
	3. Incorrect shielding gas	a. Check shielding gas.
	4. Insufficient or excessive heat input	a. Adjust the wire speed control or the voltage selection switch.
	5. Weld speed too fast	a. Reduce weld speed.

Table 6-3a: Welding Problems and Solutions

FAULT	CAUSE	REMEDY
A. Weld cracking	1. Weld beads are too small	a. Decrease travel speed
	2. Weld penetration narrow and deep	a. Reduce current and voltage and increase Mig torch travel speed or select a lower penetration shielding gas.
	3. Excessive weld stresses	a. Increase weld metal strength or revise design
	4. Excessive voltage	a. Decrease voltage by reducing the voltage selection switch.
	5. Cooling rate too fast	a. Slow the cooling rate by preheating part to be welded or cool slowly.
	6. Weld speed too fast	a. Reduce weld speed.
B. Cold weld puddle	1. Faulty rectifier unit	a. Have an Accredited THERMAL ARC Service Agent to test then replace the faulty component.
	2. Loose welding cable connection.	a. Check all welding cable connections.
	3. Low Primary Voltage	a. Contact supply authority
	4. Weld speed too fast	a. Reduce weld speed.
C. Arc does not have a crisp sound that short arc exhibits when the wirefeed speed and voltage are adjusted correctly.	1. The MIG torch has been connected to the wrong polarity on the front panel.	a. Connect the MIG torch to the positive (+) welding terminal for solid wires and gas shielded flux cored wires. Refer to the electrode wire manufacturer for the correct polarity.
	2. Weld speed too fast	a. Reduce weld speed.

Table 6-3b: Welding Problems and Solutions continued

6.04 Power Supply Problems

FAULT	CAUSE	REMEDY
A. Indicator light is ON but welding arc can not be established.	1. Power On/Off switch in "Off" position.	a. Switch the power On/Standby switch to the "On" position .
B. Primary power supply voltage is ON. Indicator light is not lit and welding arc can not be established.	1. Primary fuse is blown.	a. Replace primary fuse.
	2. Broken connection in primary circuit.	a. Have an Accredited Thermal Arc Service Agent check primary circuit.
C. Green ON/OFF indicator light is not lit but welding arc can be established.	1. Indicator light is open circuit.	a. Have an Accredited Thermal Arc Service Agent replace Indicator light.
D. Primary power supply voltage is ON and Indicator light is lit but when the gun trigger switch is depressed nothing happens.	1. Gun trigger switch leads are disconnected.	a. Reconnect.
E. Primary power supply voltage is ON, no wire feed but gas flows from the MIG Gun when the gun trigger switch is depressed.	1. Electrode wire stuck in conduit liner or contact tip (burn-back jam).	a. Check for clogged / kinked MIG Gun conduit or worn contract tip. Replace faulty component(s).
	2. Faulty control PCB or Tweco Gun	a. Have an Accredited Thermal Arc Service Agent investigate the fault.
F. Wire feeds when the gun trigger switch is depressed but arc can not be established.	1. Poor or no work lead connection.	a. Clean work clamp area and ensure good electrical contact.
G. Wire continues to feed when the gun trigger switch is released.	1. The Weld Mode Switch has been set to 4T (latch operation).	a. Set the Weld Mode Switch to 2T (normal operation).
H. Jerky wire feed	1. Worn or dirty contact tip	a. Replace
	2. Worn feed roll	a. Replace
	3. Excessive back tension from wire reel hub roll.	a. Reduce brake tension on spool hub
	4. Worn, kinked or dirty conduit liner	a. Clean or replace conduit liner
	5. Low Swing Arm pressure	a. Increase the Swing Arm pressure.
I. No gas flow	1. Gas hose is cut or pinched	a. Check hose and replace or repair.
	2. Gas passage contains impurities	a. Disconnect gas hose from the rear of Fabricator then raise gas pressure and blow out the impurities.
	3. Gas regulator turned off	a. Turn on.
	4. Gas cylinder is empty	a. Check cylinder volume and replace or refill as needed.
J. Gas flow continues after the gun trigger switch has been released.	1. Gas valve has jammed open due to impurities in the gas or the gas line.	a. Have an Accredited Thermal Arc Service Agent repair or replace gas valve.

Table 6-4: Power Supply Problems

SECTION 7:
ADVANCED TROUBLESHOOTING

If the problem cannot be solved by the basic (external) trouble shooting guide, the Power Source covers and/or the Wire Feeder covers will have to be removed. The advanced level of troubleshooting allows the technician with a few common tools to remove the covers and analyze failures.

CAUTION:

Never open the Power Source covers unless the Mains supply voltage to the Power Source is disconnected from the Mains power point and the ON/OFF Power Switch Indicator is off

WARNING

Disconnect the Fabricator from the Input power supply voltage before disassembling.

WARNING

Do not attempt to diagnose or repair unless you have had training in electronic measurement and troubleshooting techniques.

7.01 Preliminary Checks

Vacuum dust and dirt out of the entire machine.

CAUTION

Do not blow air into the power supply during cleaning. Blowing air into the unit can cause metal particles to interfere with sensitive electrical components and cause damage to the unit.

1. Check general machine completeness.
2. Check tightness of mounting and STRUCTURAL HARDWARE and all terminations and ELECTRICAL FITTINGS.
3. NO DEFORMATION present to detract from machine's appearance or performance.
4. SWITCH AND KNOBS on front panel are secure and align with their respective markings and correct fuse(s) fitted.
5. AUXILIARY WIRING clear of Rectifier Heatsink, Inductor, Shunt or Main Transformer.
6. SUPPLY CABLE gland is correctly fastened.
7. Primary or secondary wiring does not impede AIR FLOW from the transformer windings, diode heatsink, inductor or rest on sharp edges of any sheet metal.
8. CLEARANCE of more than 10mm between adjacent bare conductors and/or any sheet metal.
9. For COMPACT version set WIRE SPOOL TENSION on hub between 1.0Nm and 1.5Nm to slowly rotate empty spool. DRIVE ROLLER TENSION to mid-position.
10. VISUAL INSPECTION - PASS

7.02 Initial Setup Conditions

Set the power supply controls and connect cables as follows:

1. ON/OFF Switch to OFF Position
2. MIG GUN / SPOOL GUN SELECTOR SWITCH to MIG GUN position
3. WIREFEED SPEED CONTROL to "4"
4. COARSE VOLTAGE SELECTOR SWITCH to position "1"
5. FINE VOLTAGE SELECTOR SWITCH to position "1"
6. WELD (SPOT/STITCH) TIMER CONTROL to minimum
7. WELD MODE SWITCH to position "2T"
8. DWELL STITCH TIMER CONTROL to minimum
9. BURNBACK CONTROL to minimum
10. Disconnect & Isolate the GUN POLARITY LEAD from OUTPUT WELDING TERMINALS
11. Connect Work cable to (-) NEGATIVE OUTPUT WELDING TERMINAL
12. Disengage PRESSURE ADJUST DEVICE so wire will not feed (See figure 3-10)

7.03 Primary Power Test

A. Close primary disconnect device and observe the following:

   1. Green Indictor Lamp inside ON/OFF Switch illuminates

B. Set ON/OFF Switch to ON position and observe the following:

   1. Fan turns on
   2. Digital Display turns on.

      The meter has two display modes: Voltage or Amperage. If last displayed character on the left is "A", depress the VOLTAGE / AMPERAGE SELECTION Switch once. The left character will change to "V".

This completes the Primary Power Test. If the above are all correct then proceed to paragraph 'B'. If the above does not function as noted then note the symptom and proceed to Section 7.08 Primary Power Problems.

7.04 Logic and Control Tests

A. Depress Gun Switch and observe the following:
   1. Gas flows
   2. Contactor energizes
   3. Feed Roll Turns
   4. Display reads approx "15.0 V"

B. Release Gun Switch
   1. Gas flow stops
   2. Contactor de-energizes
   3. Feed Roll stops
   4. Display reads "00.0V"

C. Set WELD MODE SELECTOR SWITCH to position "4T". Depress Gun Switch and observe the following:
   1. Gas flows
   2. Contactor energizes
   3. Feed Roll Turns
   4. Display reads approx "15.0 V"

D. Release GUN switch
   1. Gas continues to flow
   2 Contactor remains energized
   3. Feed roll continues to turn
   4. Display reads approx "15.0 V"

E. Depress Gun Switch
   1. Gas flow stops
   2. Contactor de-energizes
   3. Feed Roll stops
   4. Display reads approx "0.0 V"

F. Set WELD MODE SELECTOR SWITCH to position "2T". Set BURNBACK CONTROL potentiometer to maximum position. Depress Gun Switch and observe the following:
   1. Gas flows
   2. Contactor energizes
   3. Feed roll turns
   4. Display reads approx "15.0 V"

G. Release Gun Switch
   1. Feed Roll stops immediately
   2. Display reads "15.0 V"
   2. After 1 ½ seconds
      a. Gas flow stops
      b. Contactor de-energizes
      c. Display reads "0.0 V"

H. Set BURNBACK CONTROL potentiometer to minimum. Set MODE SELECTOR SWITCH to SPOT position
   1. Depress Gun Switch
      a. Gas Flows
      b. Contactor energizes
      c. Feed Roll turns
      d. Display reads "15.0 V"
      e. After .5 seconds
         1. Gas flow stops
         2. Contactor de-energizes
         3. Feed Roll stops
         4. Display reads "0.0 V"

I. Set WELD (SPOT/STITCH) TIMER CONTROL to Maximum position (4)
   1. Depress Gun Switch
      a. Gas flows
      b. Contactor energizes
      c. Feed roll turns
      d. Display reads "15.0 V"
      e. After 12 seconds
         1. Gas flow stops
         2. Contactor de-energizes
         3. Drive roll stops
         4. Display reads "0.0 V"

J. Set MODE SELECTOR SWITCH to STITCH position. Set WELD (SPOT/STITCH) TIMER CONTROL to minimum.

1. Depress Gun Switch
   a. Gas Flows
   b. Contactor energizes
   c. Feed Roll begins a cycle of turning for .5 seconds then stop turning for .5 seconds
   d. Display reads "15.0 V"
2. Released Gun Switch
   a. Gas flow stops
   b. Contactor de-energizes
   c. Feed Roll stops
   d. Display reads "0.0 V"

K. Set WELD (SPOT/STITCH) TIMER CONTROL to Maximum position "4" . Set DWELL (STITCH) TIMER CONTROL to Maximum Position "4"

1. Depress Gun Switch
   a. Gas flows
   b. Contactor energizes
   c. Feed roll begins a cycle of turning for 12 seconds then stop turning for 12 seconds
   d. Display reads "15.0 V"
2. Release Gun Switch
   a. Gas flow stops
   b. Contactor de-energizes
   c. Feed Roll Stops
   d. Display reads "0.0 V"

L. Connect voltmeter probes to JB-6 (-) and J6-8 (+). Depress the gun trigger and vary the WIRE SPEED CONTROL potentiometer from minimum to maximum. The voltage should vary from approx 4VDC up to approx 27 VDC.

M. Set COARSE VOLTAGE SELECTOR SWITCH to position "H". Set FINE VOLTAGE SELECTOR SWITCH to position "8".

N. Connect voltmeter probes to JB-6 (-) and J6-8 (+). Depress the gun trigger and vary the WIRE SPEED CONTROL potentiometer from minimum to maximum. The voltage should vary from approx 2VDC up to approx 25 VAC.

O. Set WIRE SPEED CONTROL to "4".

P. Set COARSE VOLTAGE SELECTOR SWITCH to position "L".

Q. Set FINE VOLTAGE SELECTOR SWITCH to position "1".

This completes the Logic & Control Tests. If the above are all correct then proceed to paragraph 'C'. If the above does not function as noted then note the symptom and proceed to Section 7.09 Logic & Control Problems.

7.05 Spool Gun Control (J1) Test

A. Set MIG GUN / SPOOL GUN SELECTOR SWITCH to SPOOL GUN position.

B. Connect inlet gas supply hose to spool gun gas inlet Jumper J1 terminals D & G

1. Gas Flows from Spool Gun gas outlet port on the front panel
2. Contactor W1 Closes
3. Feed Roll does not turn

C. Check voltages at the following points:

J11 PINS

From Pin H to JB-5 on MAIN PCB	1VDC
From Pin E to JB-5	4.5VDC
From Pin C to Pin B	14VDC*

(*Because there is no load from a motor this voltage will slowly drop)

7.06 Output Voltage Test

A. Set COARSE VOLTAGE SELECTOR SWITCH to position "L"

B. Set FINE VOLTAGE SELECTOR SWITCH to position "1"

C. Connect voltmeter probes to + & - WELDING TERMINALS

D. Depress Gun Switch and observe voltage

E. Repeat voltage measurements in each of the 24 combinations of the OUTPUT VOLTAGE CONTROL SWITCHES. The voltages should measure approx as outlined below.

EACH SUCCESSIVE READING MUST BE INCREASING IN VALUE

COARSE VOLTAGE SELECTOR SWITCH SETTING	FINE VOLTAGE SELECTOR SWITCH SETTING	VOLTAGE
1	1	15.3
1	2	15.9
1	3	16.2
1	4	16.9
2	1	17.4
2	2	18.1
2	3	18.5
2	4	19.3
3	1	20.4
3	2	21.4
3	3	22.1
3	4	23.1
4	1	24.1
4	2	25.3
4	3	26.2
H	1	29.9
H	2	32.1
H	3	33.5
H	4	35.9
H	5	38.2
H	6	41.5
H	7	43.5
H	8	47.4

F. Set COARSE VOLTAGE SELECTOR SWITCH to position "L"

G. Set FINE VOLTAGE SELECTOR SWITCH to position "1"

This completes the Output Voltage Tests. If the above are all correct then proceed to paragraph 'D'. If the above does not function as noted then note the symptom and proceed to Section 7.13 Output Voltage Test.

7.07 Wire Feed & Weld Test

A. Close the PRESSURE ADJUST DEVICE. Connect the GUN POLARITY LEAD to the POSITIVE WELDING TERMINAL (+).

B. Position the gun in a position ready to weld. Close the Gun Switch

1. Gas flows
2. Contactor Energizes
3. Wire feeds out of gun
4. Welding arc establishes

This completes the Wire Feed Test. If the above does not function as noted then proceed to Section 7.12 Wire Feed Problems.

7.08 Primary Power Problems

A. Green Indicator in ON/OFF Switch is not illuminated and fan does turn when ON/OFF switch is in the ON position.

1. Incorrect or insufficient primary voltage

a. Measure voltage at Primary Power Receptacle. If voltage is not correct check primary fuses/breakers.

2. Defective or improperly wired input power cable or plug.

a. Measure for 230VAC primary voltage at the terminal block where the input power cable is connected. If incorrect, check wiring in plug and continuity of primary input cable.

3. Circuit breaker CB1 tripped

a. Reset breaker

4. Defective or improperly wired input power cable or plug.

a. Measure for primary voltage at the Input Terminal Block between terminals 1 & 2 for 208 VAC input or between terminals 1 & 3 for 230VAC input (see Input Terminal Block Figure 7.1).

B. Green Indicator in ON/OFF Switch is illuminated but digital display is off and fan does not turn, when ON/OFF switch is in the ON position.

1. Circuit Breaker CB1 tripped

a. Reset CB1

2. Defective ON/OFF Switch SW1

a. Measure for 230VAC at Input Terminal Block between terminals 4 & 5. If voltage is not present, replace SW1.

3. Defective Fan Motor/Aux Transformer Assembly M1

a. Measure for 230VAC at Input Terminal Block between terminals 4 & 5. If voltage is present, replace M1.

4) Green Indicator in ON/OFF Switch is illuminated and fan turns, but digital display is off, when ON/OFF switch is in the ON position.

1) Defective PCB 4

a) Measure for 32VAC at PCB4 between X1-1 to X1-3. If voltage is correct, replace PCB 4.

7.09 Logic and Control Problems

A. Nothing happens when gun switch is depressed; No gas flow, contactor does not energize, feed rolls do not turn. TEMPERATURE LED is on.

1. Unit overheated.

a. Allow unit to cool

2. Insufficient airflow around / through unit.

a. See installation section 3.02 for clearance requirements

3. Open Thermal Protection Switch TS1 or TS2

a. Check continuity on the MAIN PCB JA connector between pins 5 & 7 and if open check the switches TS1 & TS2 individually and replace the defective switch.

B. Nothing happens when gun switch is depressed; No gas flow, contactor does not energize, feed rolls do not turn. TEMPERATURE led is off.

1. MIG GUN / SPOOL GUN SELECTOR SWITCH SW2 is in SPOOL GUN position

a. Set SW2 to MIG GUN position

2. Defective SW2

a. Check continuity of SW2.

3. Defective gun switch

a. Check continuity of gun switch

4. Open wires between gun receptacle and MAIN PCB (PCB 1)

a. Measure between JA-1 to JA-2 at the Control PCB for approx 40 VDC when switch is open and then drops to 0 VDC when gun switch is closed. If it does not drop check continuity of the wires.

5) Faulty Fan/Aux. transformer assembly M1

a. With Gun Switch depressed, measure for approx 30 VAC between the brown (#30) and orange (#31C). If low or not present, replace M1.

6. Faulty MAIN PCB (PCB 1)

a. Measure at PCB 1 between JB-5 to JA-1 for 40VDC. If voltage is not present, replace PCB-1

7). Faulty MIG TIMER PCB (PCB 2)

a. See Section 7.15

8. Faulty MAIN PCB 1

a. Measure between JB-4 to JB-11 at PCB 1 for approx 30 VAC when gun switch is closed. If voltage is not present, replace PCB.

9. Faulty SPOOL GUN PCB (PCB 3)

a) Measure at PCB1 between JB-5 to JA-2 for 21VDC. If voltage is not present, replace PCB3

C. When gun switch is closed, gas flows, contactor does not energize, feed roll does not turn.

1. Defective Contactor W1

a. Measure for 30VAC on the contactor coil between White wire (#31C) and white wire (#32A). If voltage is present replace W1.

D. When Gun Switch is closed, no gas flows but contactor closes and feed rolls turn.

1. Gas supply not connected or turned on

a. Verify gas supply to unit is correct and connected to the gas inlet labeled:

2. Defective Gas Solenoid SOL1

a. With gun switch closed, measure for 30VAC on the gas solenoid between Orange wires (#31A & 31B) and Blue wire (#33). If voltage is present replace gas solenoid.

3. Defective MIG GUN / SPOOL GUN SELECTOR SWITCH SW2

a. With gun switch closed, measure for 30VAC on the gas solenoid between Orange wires (#31A or 31B) and Blue wire (#33). If voltage is not present, check SW2.

E. When Gun Switch is closed, gas flows, contactor closes, display shows 15 volts, but feed rolls do not turn

1. CB2 5 amp Circuit Breaker tripped

a. Reset CB2

2. Defective WIRE FEED MOTOR M2

a. With Gun Switch closed, measure for approx 2-16 vdc variation at the control PCB between JB-6 to JB-8 as the WIRE SPEED CONTROL potentiometer is varied from minimum to maximum. If voltage is correct, replace motor.

3. Open wire from Rectifier assembly to Control PCB.

a. With gun switch closed, measure for approx 15 VDC at Control PCB between JB7 (-) to JB9 (+). If no voltage, check wire continuity and replace open wire.

4. Faulty MAIN PCB

a. With gun switch closed, measure voltage between JB-6(-) to JB-8 (+) for approx 10 VDC. If voltage is 0 VDC, replace Control PCB.

5. Defective PCB 3

a. With Gun switch closed and WIRE FEED SPEED set to "4" , measure voltage between JB-8 on the MAIN PCB to X1-3 on PCB 3 for approximately 12VDC . If voltage is not present, replace PCB 3.

F. When Gun Switch is closed, gas flows, contactor closes, display shows 0 volts, and feed roll does not turn.

1. Defective Contactor W1

a. With Gun Switch closed, measure for 230VAC at the contactor between terminals T1 to T3. If voltage is low or not present, replace W1.

2. Defective FINE or COARSE VOLTAGE CONTROL SWITCH

a. See VOLTAGE CONTROL SWITCH test procedure, page 7-11.

3. Defective Rectifier assembly

a) Check per the diode test procedure page XXX.

4. Defective Main transformer

a) Check main transformer per test procedure page XXX.

G. When Gun Switch is closed, gas flows, contactor closes, feed roll turns, but display shows 0 volts.

1. Open wire between shunt and PCB4.

a. Check wire continuity and replace if open.

2. PCB 4 is defective.

a. Measure voltage between X1-3 to X1-1 for 32VAC. If voltage is correct, replace PCB4.

7.10 Spool Gun Control (J1) Problem

A. Gas does not flow when jumper is connected between J11 Pins D & G

1. Gas supply not connected or turned on

a. Verify gas supply to unit is correct and connected to the gas inlet labeled:

2. Defective gas solenoid SOL2

a. Measure for 32VAC at SOL2 between Orange wires (# 31B) and Red wire (#60). If voltage is correct replace SOL2.

3. Defective PCB3

a. Measure voltage between X3-5 to X3-4 on PCB3 for 0VAC. If voltage not correct, replace PCB3.

B. Voltages to J1 are not correct when jumper is installed between pins D & G

1. Defective PCB 3

a. Measure voltage between X3-3 to X3-4 for 0VDC when jumper is installed between J1-D & G. If voltage is correct, replace PCB 3.

7.11 Output Voltage Problem

A. Output is low in one or more OUTPUT VOLTAGE CONTROL SWITCH positions

1. Defective OUTPUT VOLTAGE SELECTION SWITCH

a. Check continuity of switch. See test procedure page 7-11.

2. Defective MAIN TRANSFORMER

a. Check Main transformer per test procedure on page 7-14.

7.12 Wire Feed and Weld Problems

A. Poor or inconsistent arc transfer or no arc transfer

1. Poor work cable connection or open work cable

a. Clean contact point, check continuity of cable and cable to clamp connection. Replace if work cable if required.

B. Wire feed and welding problems

(Refer to sections 6.03 & 6.03)

7.13 Terminal Block Voltage Test

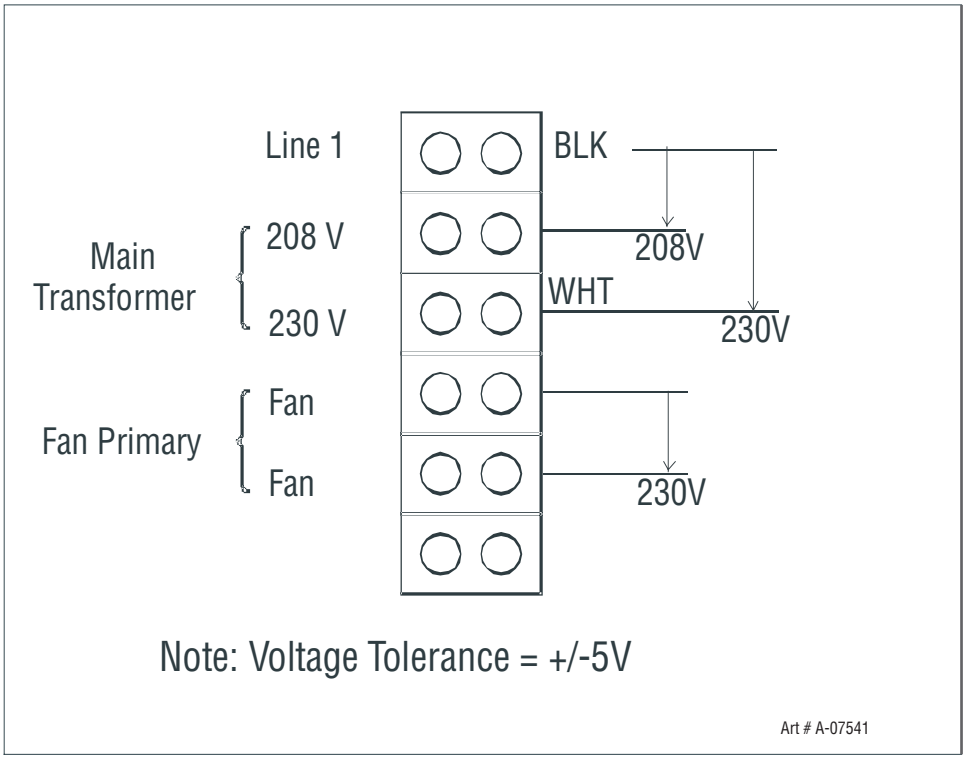

Figure 7-1: Input Terminal Block Diagram

7.14 SW3 Coarse and SW4 Fine Rotary Switch Test

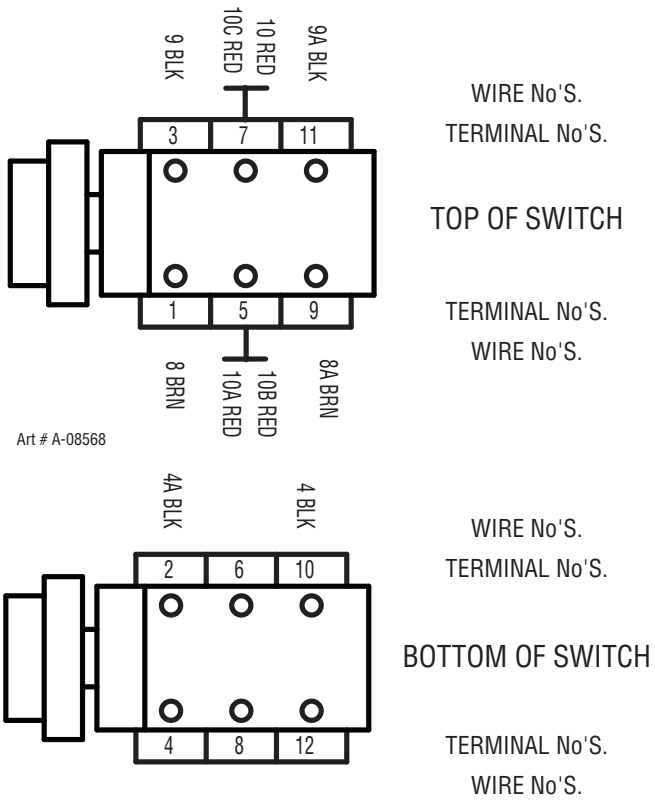

Figure7-2: 3-Position Rotary Switch, Coarse

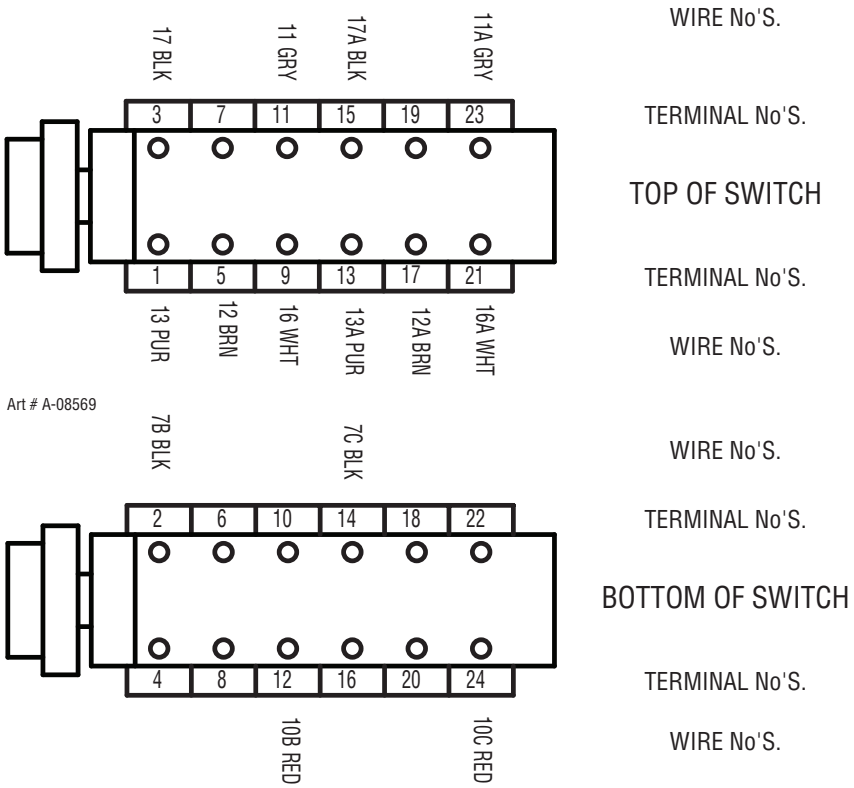

Figure 7-3: 8-Position Rotary Switch, Fine

VOLTAGE CONTROL SWITCH TEST

One at a time remove SW-3 and SW-4 from front panel, disconnect wires, reconnect to panel and check continuity of switch per figure 7-5.

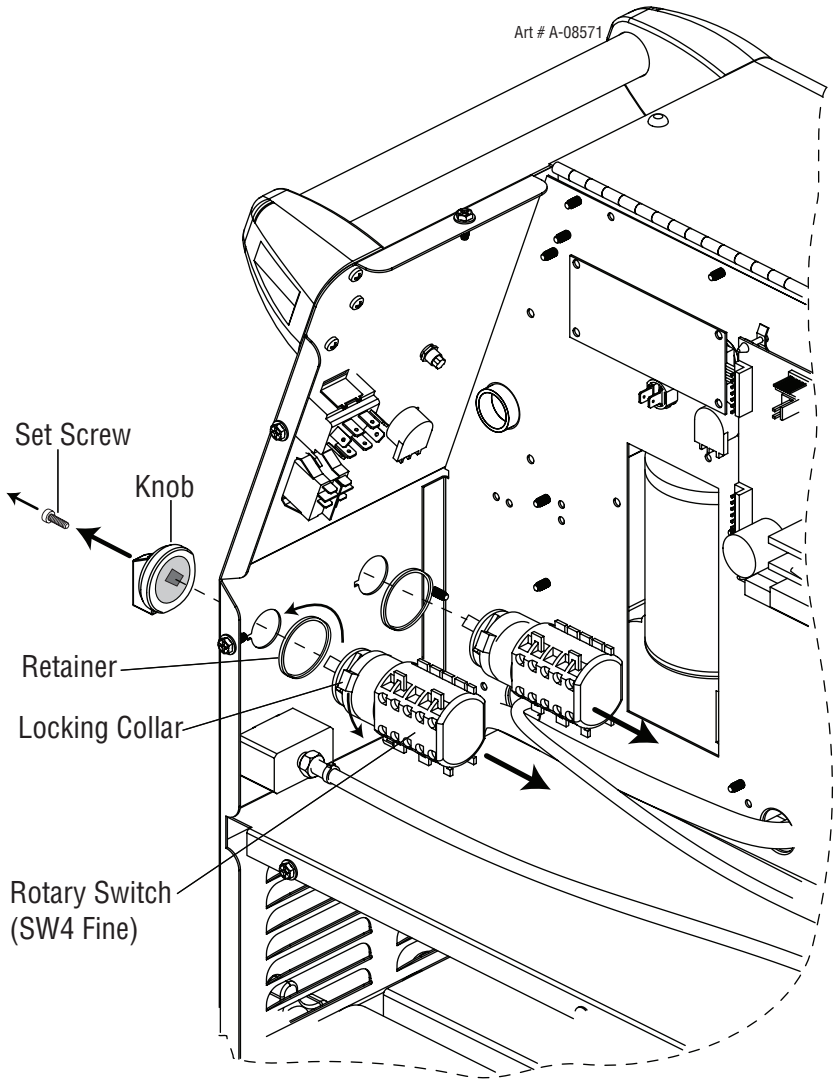

Figure 7-4: Rotary Switch SW3 and SW4 Removal

SWITCH 2 COARSE						
POSITION	1-2	3-4	5-6	7-8	9-10	11-12
L	X				X	
M		X				X
H			X	X		

SWITCH 3 FINE													
SWITCH POSITION	1-2	3-4	5-6	7-8	9-10	11-12	13-14	15-16	17-18	19-20	21-22	23-24
1	X					X	X					X
2		X				X		X				X
3	X		X				X		X			
4		X	X					X	X			
5	X				X		X				X	
6		X			X			X			X	
7	X			X			X			X		
8		X		X				X		X		

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Figure 7-5: SW3 & SW4 Continuity

7.15 MIG Timer PCB (PCB2) Test

Using the MAIN PCB terminal JB-5 as common measure the voltage at JD-1. This should measure 20VDC when the Gun Switch is closed. Then measure the voltage at JD-2.

WELD MODE SELECTOR WITCH POSITION	VOLTAGE AT JD-2
2T	10VDC when Gun Switch closed. Drops 0VDC when Gun Switch is released.
SPOT	10VDC for duration of SPOT TIME then 3.3VDC. Drops to 0VDC when Gun Switch is released.
STITCH	10 VDC for durations of STICH TIME. 3.3VDC for durations of DWELL TIME. Drops to 0VDC when Gun Switch is released.
4T	14VDC at 1st Gun Switch closure Drops to 0VDC at second Gun Switch closure.

If the voltages are not found to be correct, replace PCB2.

To confirm the rest of the circuitry is working, disconnect JC connector from Main PCB and place a jumper between JD-1 to JD-2. When the Gun Switch is closed: (This test disables the Timer functions and will only function as if in the 2T WELD MODE)

Gas Flows

Contactor energizes

Feed Roll turns

Display reads output voltage

7.16 Rectifier Assembly Test

1. Disconnect one of the Main Transformer connections from the rectifier assembly.
2. Disconnect and isolate wires from the Negative output of the Rectifier Assembly See Figure 7-3.
3. Disconnect JB connector from MAIN PCB 1.
4. Using a meter check the diode readings between the following points:

   Forward biased diode junction:

   Positive meter probe on rectifier plates 2 and 3 to plates 1 & 4

   Negative meter probe on rectifier plates 1 & 4 to plates 2 & 3

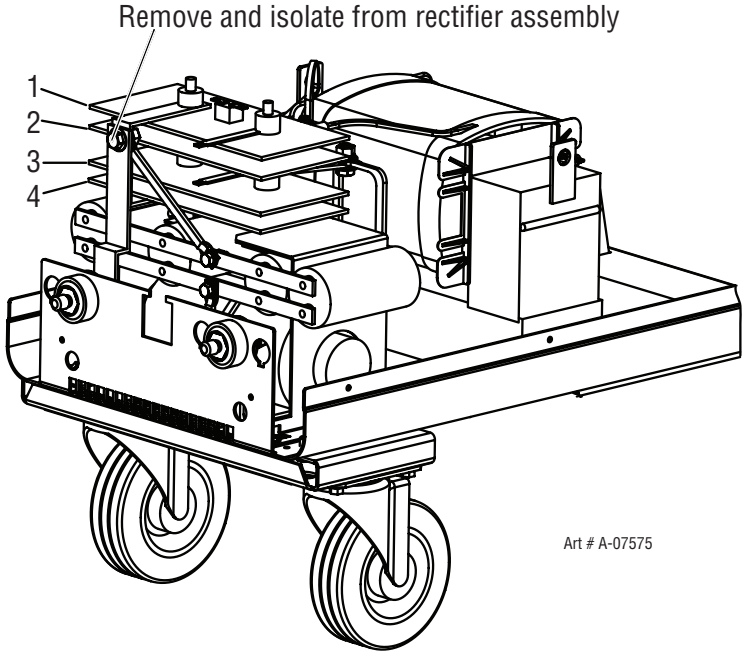


Figure 7-3: Rectifier Assembly Test

Double forward biased junction:

Positive meter probe on rectifier plates 1 & 4 to positive rectifier output terminal (Picture needed)

7.17 Main Transformer Test

Disconnect the secondary of the Main Transformer T2 from the rectifier bridge and measure output voltage between the two transformer output connections as follows:

COARSE VOLTAGE SELECTION SWITCH SETTING	FINE VOLTAGE SELECTOR SWITCH SETTING	VOLTAGE AC (approx.)
L	1	11.8
L	2	12.2
L	3	12.5
L	4	12.9
L	5	13.2
L	6	13.8
L	7	14.0
L	8	14.6
M	1	15.3
M	2	16.0
M	3	16.5
M	4	17.3
M	5	17.9
M	6	18.9
M	7	19.5
M	8	20.6
H	1	22.1
H	2	23.6
H	3	24.7
H	4	26.4
H	5	28.0
H	6	30.2
H	7	31.8
H	8	34.8

SECTION 8:
CIRCUIT OPERATION

8.01 Circuit Operation Of The Control PCB 7977964

Power Supply

24VAC is taken from the auxiliary wiring of the fan. This voltage is then connected to the PCB 7977964 where it is half wave rectified and filtered. This voltage is then fed to a zener regulator to provide the +15VDC supply for the electronics on the circuit board

Inputs to the Control PCB

CONNECTOR JA

Terminal JA-1
trigger input=40VDC trigger open, approx 20VDC trigger closed
reference JA-5

Terminal JA-2
trigger input=0VDC trigger open, approx 20VDCV trigger closed
reference JA-5

Terminal JA-3
spot timer pot=12VDCV trigger closed 0VDC trigger open
reference JA-5

Terminal JA-4
spot timer pot= ramps up to 12V from 0V when trigger closed
0VDC when trigger open
reference JA-5

Terminal JA-5
PCB common

Terminal JA-6
over temperature LED anode = approx 2VDC when overtemp led is ON, 0V when off
reference JA-5

Terminal JA-7
over temperature switch=0VDC temp switch closed, approx 15VDCV switch open
reference JA-5

CONNECTOR JE

Burnback potentiometer
100k potentiometer between pins

Terminal JE-1
burnback potentiometer 0VDC
reference PCB common

Terminal JE-2
burnback potentiometer approx 13VDC when trigger on
ramps down to zero after trigger is released
reference JA-5

CONNECTOR JB

Terminal
JB-1 wiper of wire speed control potentiometer, varies between <2V to approximately 4.7VDC (pot wiper)
reference JA-5 or JB-5

Terminal JB-2
wire speed control potentiometer minimum (pot low) approximately 2VDC
reference JA-5

Terminal JB-3
wire speed control potentiometer maximum approximately 4.7VDC
reference JA-5

Terminal JB-4
32VAC supply from auxiliary winding on fan
reference JA-5 or JB-5

Terminal JB-5
PCB common. Return for 32VAC supply from auxiliary winding on M1

Terminal JB-6
Motor positive terminal 0VDC - 24VDC with speed pot
reference JB-8

Terminal JB-7
negative welding output voltage
reference JB-9

Terminal JB-8
Motor negative terminal 0VDC to -24VDC with speed pot
reference JB-6

Terminal JB-9
positive welding voltage

Terminal JB-10
return for 32VAC supply from auxiliary winding on M1
reference JB-5

Terminal JB-11
relay contact to control SOL1 & W1 closes to complete circuit to JB-10
reference JB-4

CONNECTOR JB

Torch circuit jumper installed

8.02 Circuit Operation Of The MIG Timer PCB 7977965

This board is connected by way of a 6-way cable and does not have any terminals available to measure.

8.03 Circuit Operation Of The Digital Volt/Amp PCB 704883

Terminal X13/1
24VAC supply for board
measure 24VAC wrt X13/3

Terminal X13/2
no connection

Terminal X13/3
24VAC supply for the board
measure 24VAC
wrt X13/1

Terminal X13/4
PCB common, weld volts negative
shunt negative PCB 0V

Terminal X13/5
shunt positive
measure a few hundred mV
wrt X13/4 when welding output is loaded

Terminal X13/6
weld volts positive
measure welding output voltage
wrt X13/4

8.04 Circuit Operation Of The Spool Gun PCB 7978034

CONNECTOR X1

Terminal X1/1
motor relay "normally open" - connects to spool gun motor
measure 0 to 24VDC (depends on wire speed setting)
wrt 7977964 JB/8 in spool gun setting

Terminal X1/2
motor relay "common" - connects to motor output from 7977964 PCB
connects to 7977964 JB/6

Terminal X1/3
motor relay "normally closed" - connects to main wire feed motor
measure 0 to 24VDC (depends on wire speed setting)
wrt 7977964 JB/8 in normal setting

Terminal X1/4
solenoid relay "normally open" - connects to spool gun solenoid

Terminal X1/5
solenoid relay "common" - connects to 24VAC supply

Terminal X1/6
solenoid relay "normally closed" - connects to main solenoid

CONNECTOR X2

Terminal X2/1
wirespeed relay "normally open" - connects to spool gun wirespeed pot wiper
measure 0 to 5VDC (depends on wire speed setting)
wrt 7977964 JA/5 in spool gun setting

Terminal X2/2
wirespeed relay "common" - connects to wirespeed potentiometer input of 7977964 PCB
measure 0 to 5VDC (depends on wire speed setting)
wrt 7977964 JA/5

Terminal X2/3
wirespeed relay "normally closed" - connects to main wirespeed pot wiper
measure 0 to 5VDC (depends on wire speed setting)
wrt 7977964 JA/5 in normal setting

Terminal X2/4
trigger relay - connects to trigger input of 7977964 PCB

Terminal X2/5
trigger relay - connects to trigger input of 7977964 PCB

Terminal X2/6
no connection

CONNECTOR X3

Terminal X3/1
normal trigger input
measure approx 2.5VDC
wrt D11 anode when trigger open & approx 6VDC when trigger closed
wrt D11 anode

Terminal X3/2
normal trigger input
measure approx 14VDC
wrt D11 anode when trigger open & approx 6VDC when trigger closed
wrt D11 anode

Terminal X3/3
spool gun trigger input
measure approx 2.5VDC
wrt D11 anode when trigger open & approx 6VDC when trigger closed
wrt D11 anode

Terminal X3/4
spool gun trigger input
measure approx 14VDC
wrt D11 anode when trigger open & approx 6VDC when trigger closed
wrt D11 anode

Terminal X3/5
24VAC supply for board
measure approx 24VAC
wrt X3/6

Terminal X3/6
24VAC supply for board
measure approx 24VAC
wrt X3/5

SECTION 9: PARTS LIST

9.01 Equipment Identification

All identification numbers as described in the Introduction chapter must be furnished when ordering parts or making inquiries. This information is usually found on the nameplate attached to the equipment. Be sure to include any dash numbers following the Part or Assembly numbers.

9.02 How To Use This Parts List

The Parts List is a combination of an illustration and a corresponding list of parts which contains a breakdown of the equipment into assemblies, subassemblies, and detail parts. All parts of the equipment are listed except for commercially available hardware, bulk items such as wire, cable, sleeving, tubing, etc., and permanently attached items which are soldered, riveted, or welded to other parts. The part descriptions may be indented to show part relationships.

To determine the part number, description, quantity, or application of an item, simply locate the item in question from the illustration and refer to that item number in the corresponding Parts List.

PART NUMBER:

Fabricator 251	**100048D-002**

9.03 External Replacement Parts

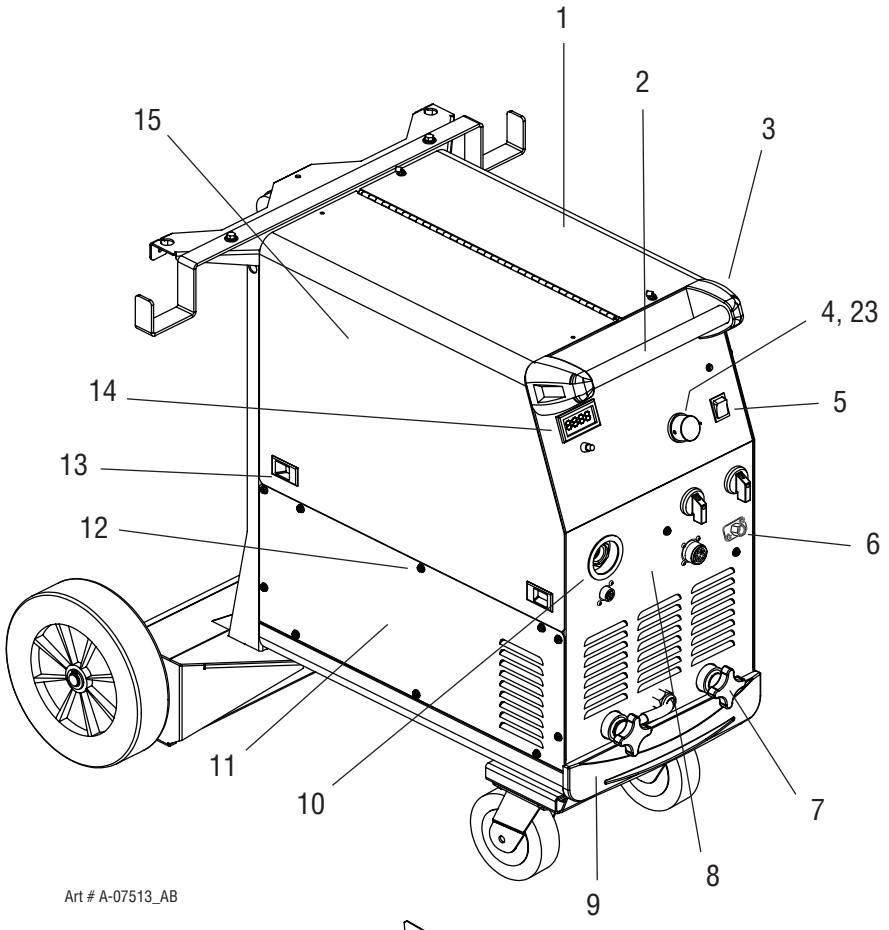
ITEM	PART NUMBER	DESCRIPTION	REF DESIGNATION	QTY
1	707267PKD	Panel, Cover, Fab210/251		1
2	705956PKD	Handle Bar, Fab210/251/281		1
3	705936PKD	Handle Mount, Fabricator		2
4	870696PKD	Knob,Control, 1/4" IDx1.6"		1
5	7977884PKD	Switch, DPST, Grn, 16A, 250V	SW1	1
6	*870883PKD	Adaptor, Gas Connection, 5/8"-18 (See * note below)		1
7	7977978	Knob, Output Terminal, Fabs		2
8	707262PKD	Panel, Front, Fab251		1
9	705937PKD	Molding, Front, Fab210/251/281		1
10	871011PKD	Bushing Torch		1
11	707259CLAPKD	Panel, Side LH, Fab210/251		1
12	SEE NOTE 1	Screw, Hex HD, M5x13mm, Self Tap		41
13	7977683PKD	Latch, Slide, Door Latch		2
14	704883PKD	PCB, Digital Meter, Fab251/281	PCB4	1
15	707258PKD	Door, Fab210/251		1
16	871024PKD	Box, Parts, Fab210/251/281		1
17	707305PKD	Harness, Control Wiring, Fab251		1
18	707304PKD	Harness, Power Wiring, 251/281		1
19	707264PKD	Panel, Rear, Fab251		1
20	831275PKD	Label, Weld Guide, Fab251		1
21	706916PKD	Work Cable & Clamp, Fab210/251		1
22	705620PKD	Chain, 700mm Long, Fabricators		2
23	See Note 2	Potentiometer, 1K	R1	1
24	870734	Knob, Control, 1/4" IDx.57"		4
25	See Note 2	Potentiometer, 100K	R2	1

Note

*870883PKD is for systems at revision ? or later. Systems prior to that will need upgrade kit 871007PKD.

1. These parts are available at most hardware stores.

2. These parts are available at most electronic parts stores.



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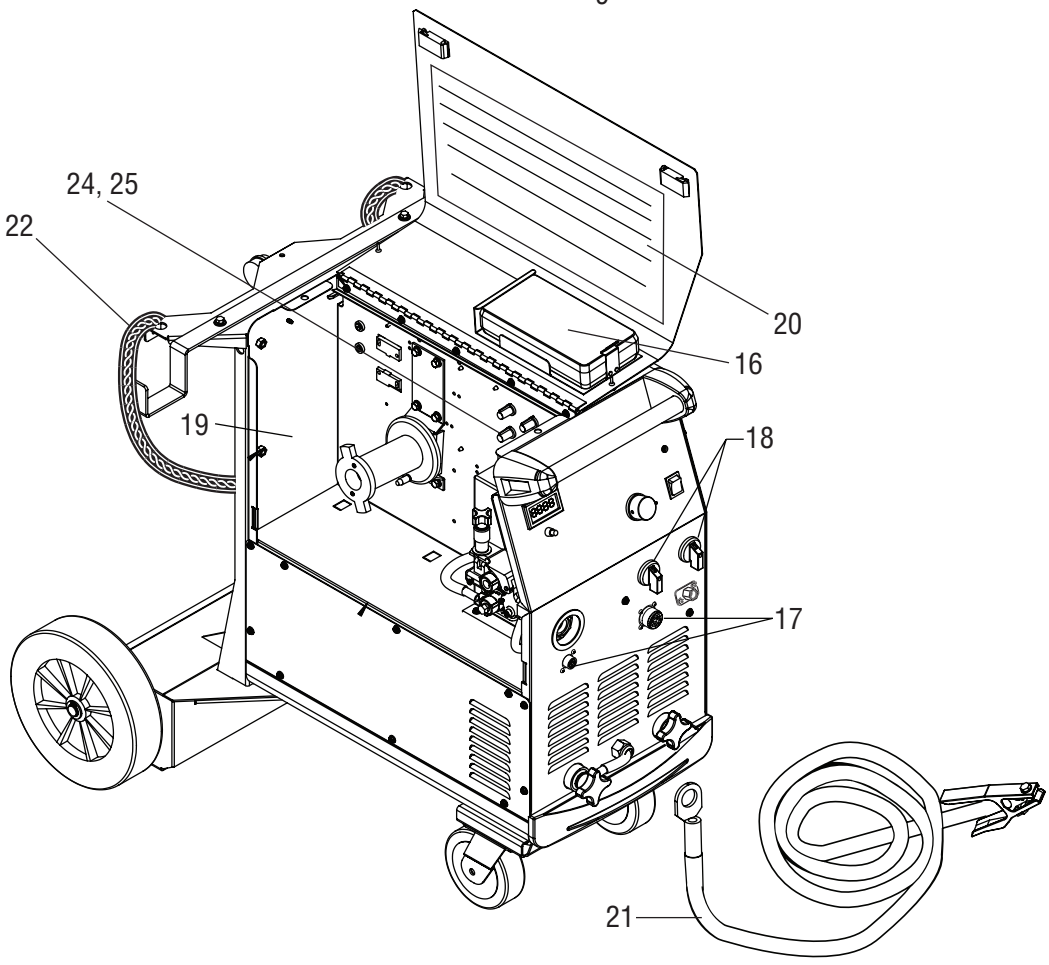


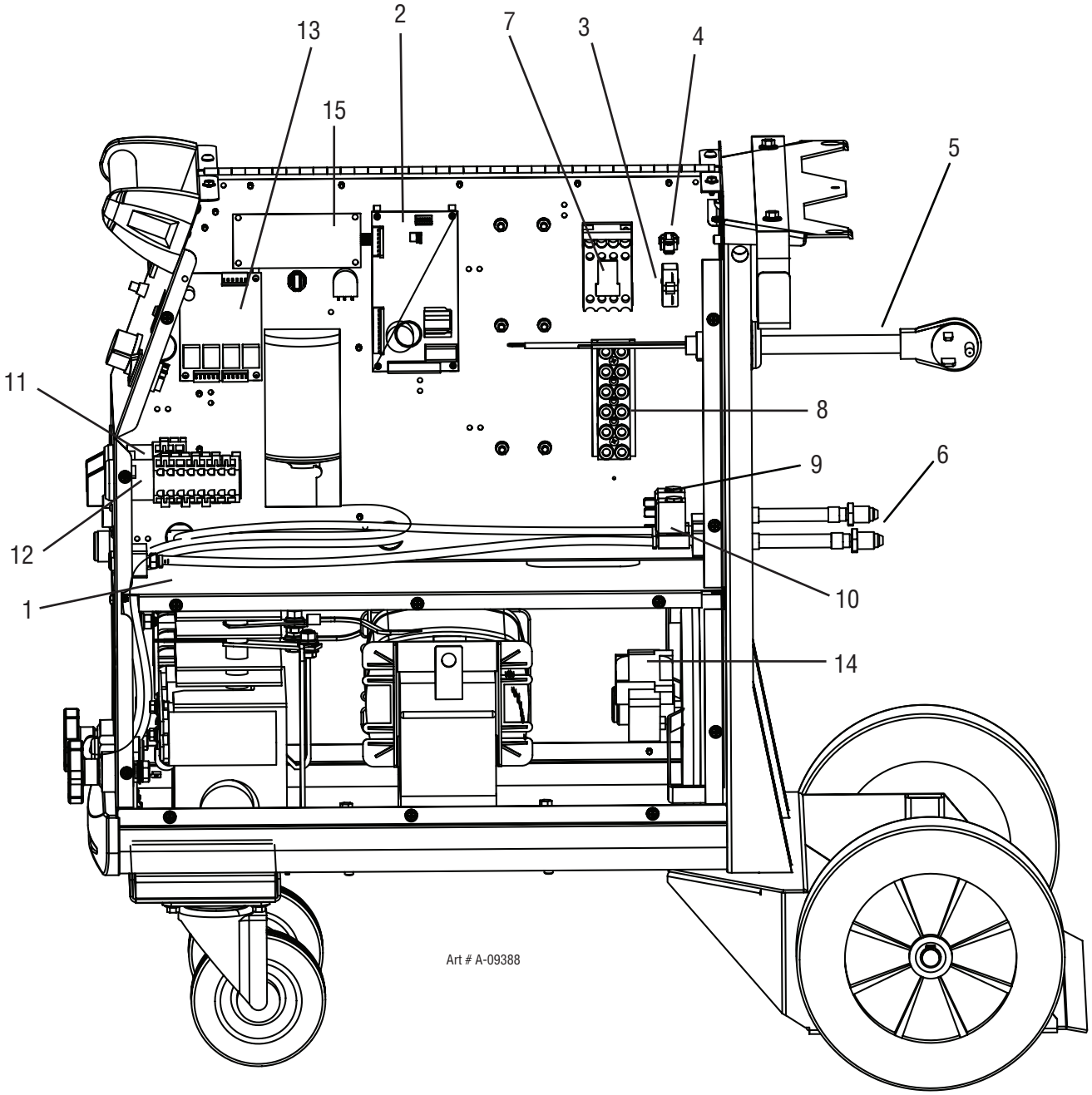
9.04 Internal Replacement Parts (1)

ITEM	PART NUMBER	DESCRIPTION	REF DESIGNATION	QTY
1	707216WBLKPKD	Panel, Baffle, Fab210/251/281		1
2	7978050	PCB, Control, Fabricators	PCB1	1
3	203627-001	Circuit Breaker, 5A	CB2	1
4	7978041PKD	Circuit Breaker, 2A	CB1	1
5	401840-003	Cable, Power Cable, Fab251/281		1
6	*705270	Gas Hose, 5/8"BSP,Fabricators (See *note below)		2
7	7978001PKD	Contactor, 32A, 3 Pole,24VAC	W1	1
8	7976580	Terminal Block, 6 Way, 110A		1
9&10	*7977867PKD	Solenoid Assy, Fabricators (See * note below)	SOL1 & 2	1
11	7977951	Switch, 32A,3 Pos, Fab251/281	SW2	1
12	7977950	Switch, 32A,8 Pos,Fab251/281	SW3	1
13	7978034PKD	PCB, Spool Gun, Fab251/281	PCB3	1
14	7978038PKD	Fan Assy, 208-230VAC, 8", 24Vac	M1	1
15	7977965PKD	PCB, Timer, Fab210/251/A2281	PCB2	1

Note

#6 above: *705270 is for systems at revision ? or later. Systems prior to that need to use 707206PKD. If kit 871007PKD has been installed then you will need to order 705270

9&10 above: *7977867PKD is for systems at revision ? or later. Systems prior to that will need upgrade kit 871007PKD.


13
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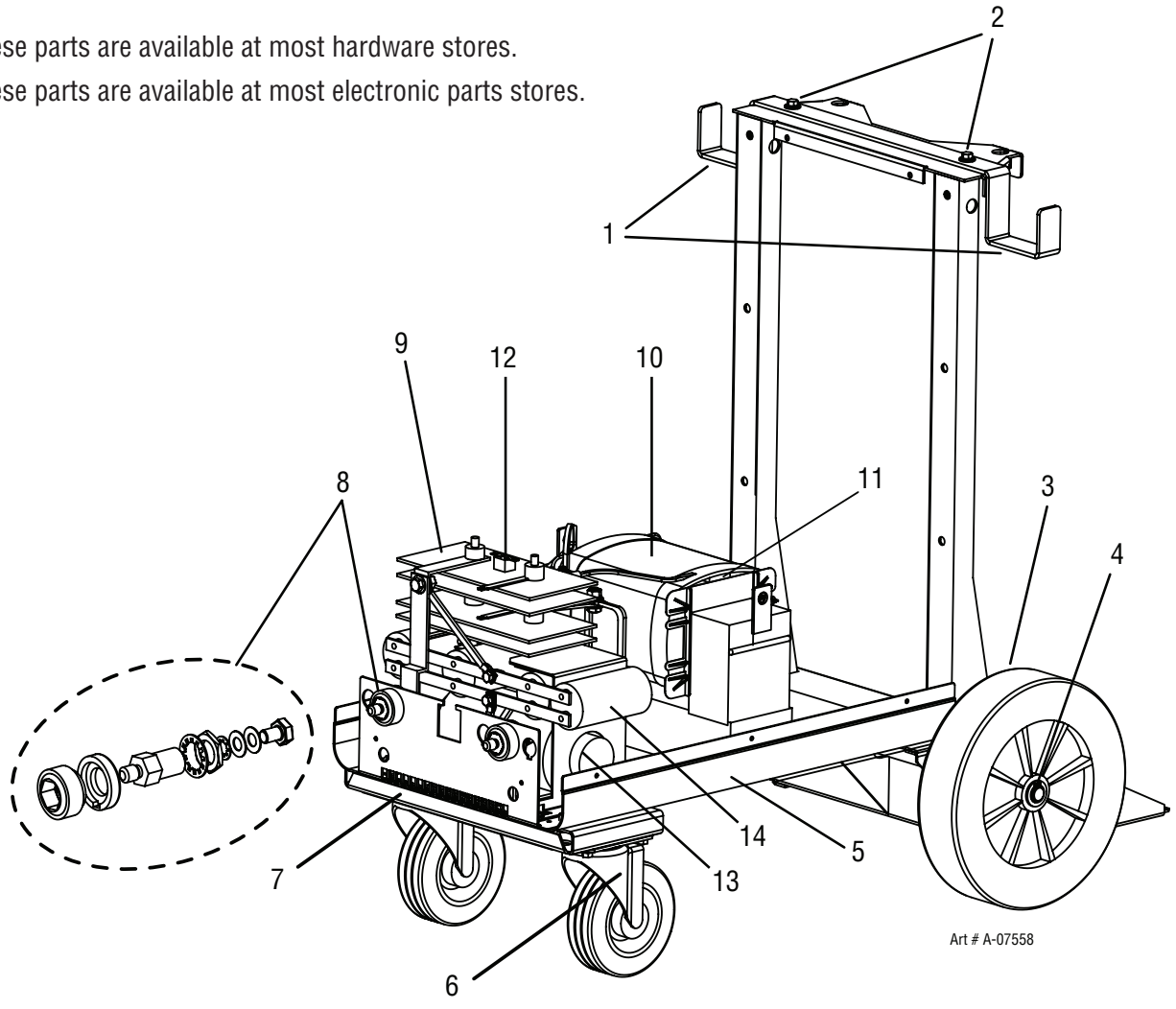
Art # A-09388

9.05 Major Electrical and Mechanical Replacement Parts

ITEM	PART NUMBER	DESCRIPTION	REF DESIGNATION	QTY
1	707230WBLK	Bracket, Cable Hanger, 251/281		1
2	See Note 1	Screw, Hex HD,M8x12mm, Self Tap		2
3	7978035PKD	Wheel, 5/8" IDx10" OD		2
4	871046PKD	Clip, Retaining, 5/8" ID		2
5	707256WBLKPKD	Panel, Base, Fab210/251/281		1
6	7977566	Castor, Swivel, 5" Wheel		2
7	870921WBLKPKD	Bracket, Front Wheels		1
8	7977974	Terminal, Output, Fabricators		2
9	7977962	Rectifier, 300A, Fab251/281	BR1	1
10	707308PKD	Transformer, Fab251/281	T1	1
11	7977832PKD	Switch, Thermostat, 207°C	TH1	1
12	See Note 2	Switch, Thermostat, 100°C	TH2	1
13	706968	Reactor, Fab251/281	L1	1
14	10-6131	Capacitor 22000uF, 63V	C1-C4	4

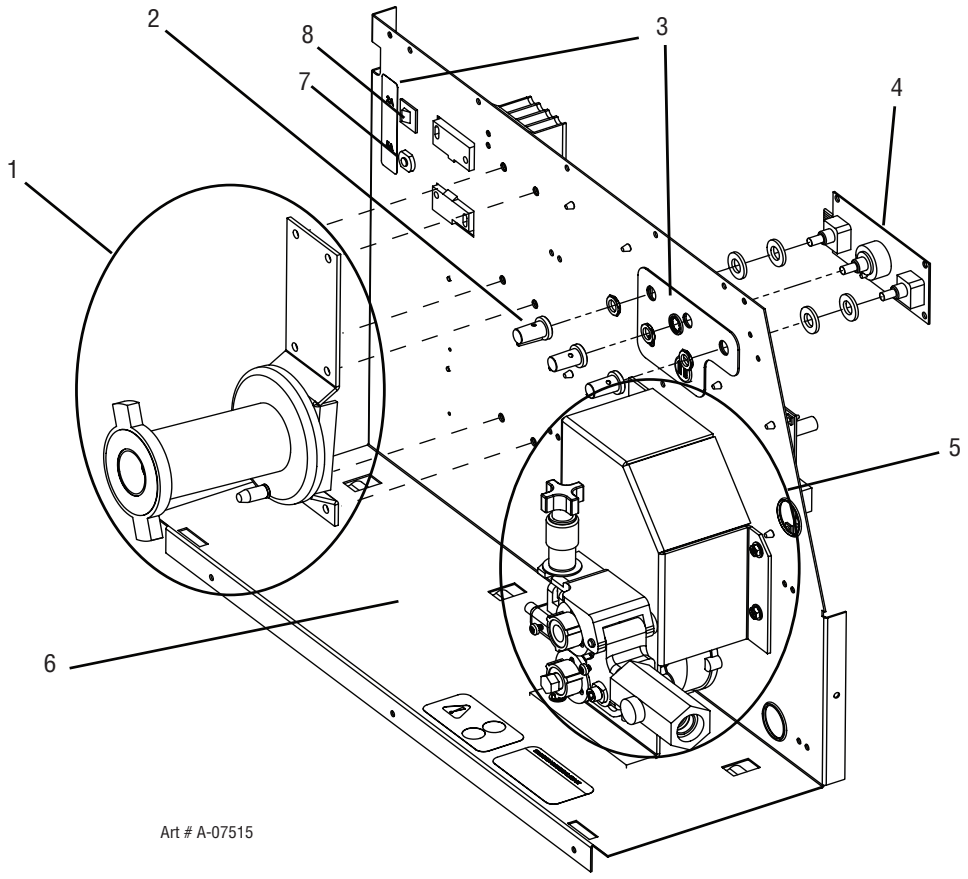
Note

1. These parts are available at most hardware stores.
2. These parts are available at most electronic parts stores.



9.06 Internal Replacement Parts (2)

ITEM	PART NUMBER	DESCRIPTION	REF DESIGNATION	QTY
1	871048PKD	Hub Spool Assy, Fab210/251		1
2	870734	Knob,Control, 1/4" IDx.57"		4
3	871051PKD	Label, Int. Controls, Fab210/251		1
4	7977965PKD	PCB, Timer, Fab210/251/A2281	PCB2	1
5	871010PKD	Feed Plate Assy, 2 Roll, 210/251		1
6	707265WBLK	Panel, Internal, Fab210/251		1
7	203627-001	Circuit Breaker, 5A	CB2	1
8	7978041PKD	Circuit Breaker, 2A	CB1	1

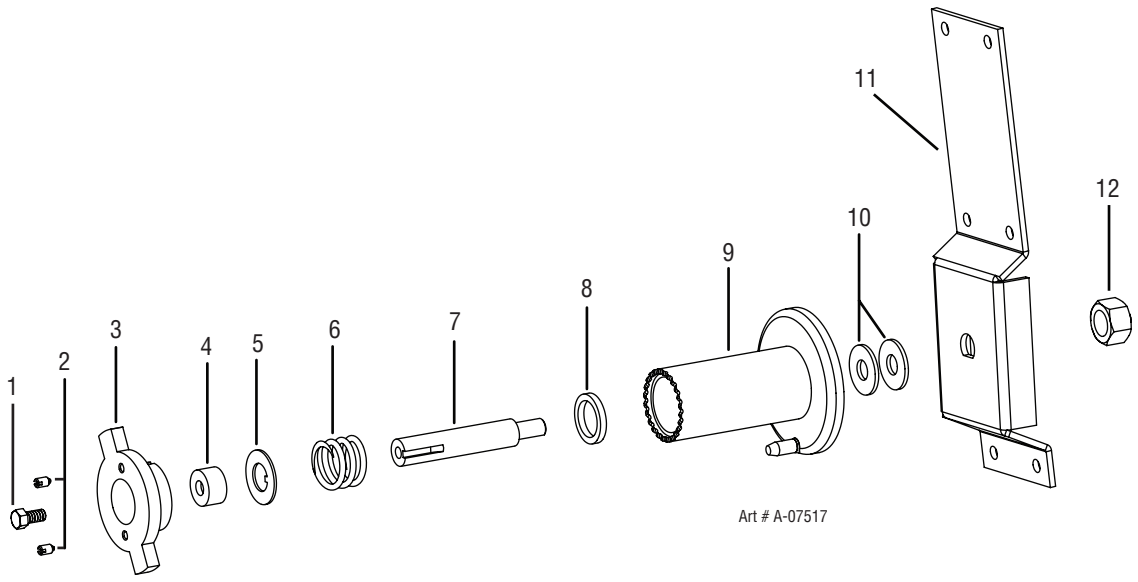


9.07 Internal Replacement Parts-Spool Assembly

ITEM	PART NUMBER	DESCRIPTION	QTY
1	See Note	Screw, Hex HD, 3/8"-16x3/4",STZP	1
2	170459-001	Plunger, Spring, Nut Hub	2
3	405377	Nut, Wire Spool Hub	1
4	374552-001	Spacer, Spool Hub	1
5	374551	Washer, 3/4", Flat,Keyed, Hub	1
6	400562-027	Spring, Spool Hub	1
7	707251PKD	Shaft, Wire Spool Hub	1
8	405448	Washer, 1-1/64", Flat, Nylon, Hub	1
9	405376	Hub, Wire Spool	1
10	See Note	Washer, 1/2" IDx1.45" OD, Flat	2
11	707197WBLKPKD	Bracket, Wire Spool, Fab210/251	1
12	See Note	Nut, Hex, 1/2"-13	1

Note

These parts are available at most hardware stores.

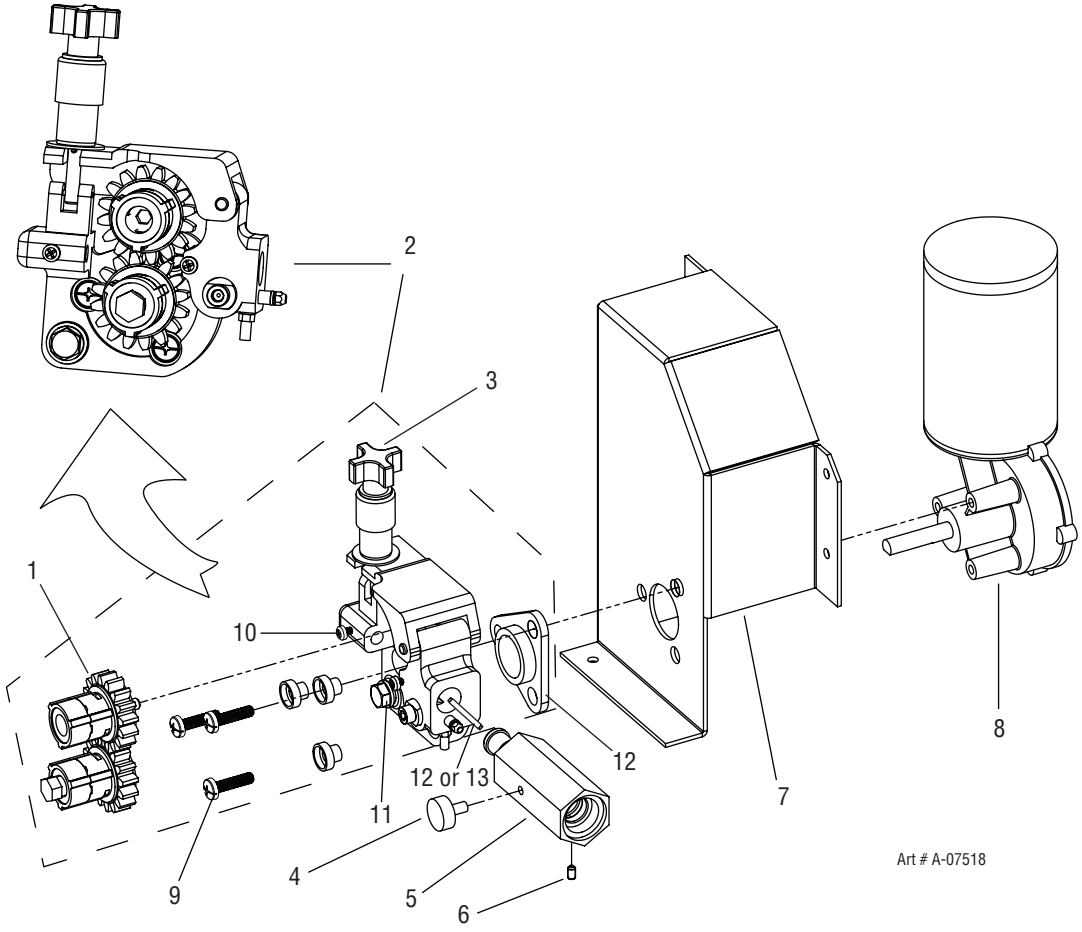


9.08 Internal Replacement Parts-Wire Feeder

ITEM	PART NUMBER	DESCRIPTION	QTY
Feed rolls and guides may be found in the Feed Roll kit located in the Appendix section of this manual.			
1	871001PKD	Gear, Idle Roll, 2R Plate	1
2	871010PKD	Feed Plate Assy, 2 Roll, 210/251	1
3	870082	Knob, Control, 1/4" ID x 3/4"	1
4	10-6187	Knob, Torch Locking	1
5	871173PKD	Adapter, Tweco #4, 2R Plate	1
6	See Note	Screw, Skt Set, M4-0.7x 4mm	1
7	871012WBLKPKD	Bracket, Feed Plate, Fab210/251	1
8	870891PKD	Motor, Wire Drive, 3.2A 20VDC	1
9	See Note	Screw, PHCR, M6-1x20mm, STZP	3
10	See Note	Screw, PHCR, M4-0.4x10mm, STZP	2
11	See Note	Screw, Hex HD, M8-1.25x16mm, STZP	1
12	871174PKD	Guide, Outlet, .023-.035, 210/251	1
13	90935	Guide, Outlet, 1.2 & 1.6MM, 210/251	1

Note

These parts are available at most hardware stores.

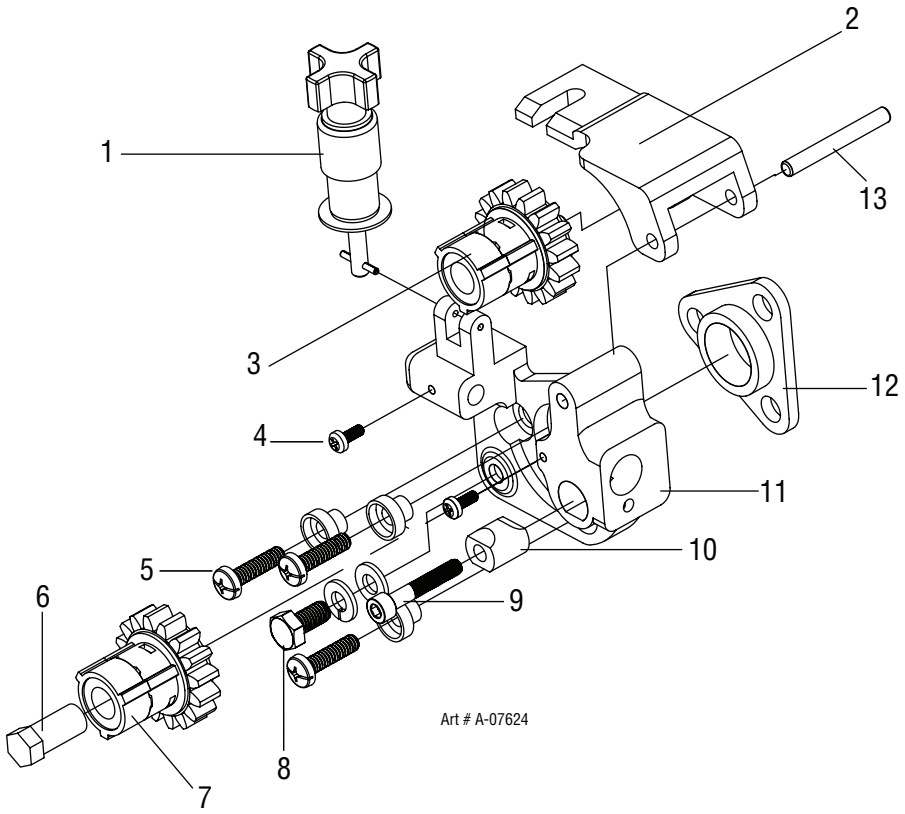


9.09 Wire Feeder Replacement Parts

Item	Qty	Ref. Des.	Description	Part Number
1	1		Rod, Tension Subassembly, WF	870933PKD
2	1		Pressure Arm, 2R M/C, WF	870679PKD
3	1		Gear, Idler Assembly, WF	871001PKD
4	2		Screw, M4x10 Pan Head, WF	See note
5	3		Screw, M6x1, 30 MM long, WF	See note
6	1		Retainer, Drive Gear,2R Plate	870733PKD
7	1		Gear, Drive Roll, 2R Plate	870560PKD
8	2		Screw, M8 X 16 Hex Head, WF	See note
9	1		Screw, M6x1, 35MM Long, WF	See note
10	1		Clamp, MIG gun,2R Plate	171362
11	1		Feedplate, 2 Roll , WF	870558PKD
12	1		Insulator, Motor, 2R Plate	870695-001PKD
13	1		Pin,#6x50mm,2R & 4R Plate	870509

Note

These parts are available at most hardware stores.



APPENDIX 1: OPTIONAL ACCESSORIES AND CONSUMABLES

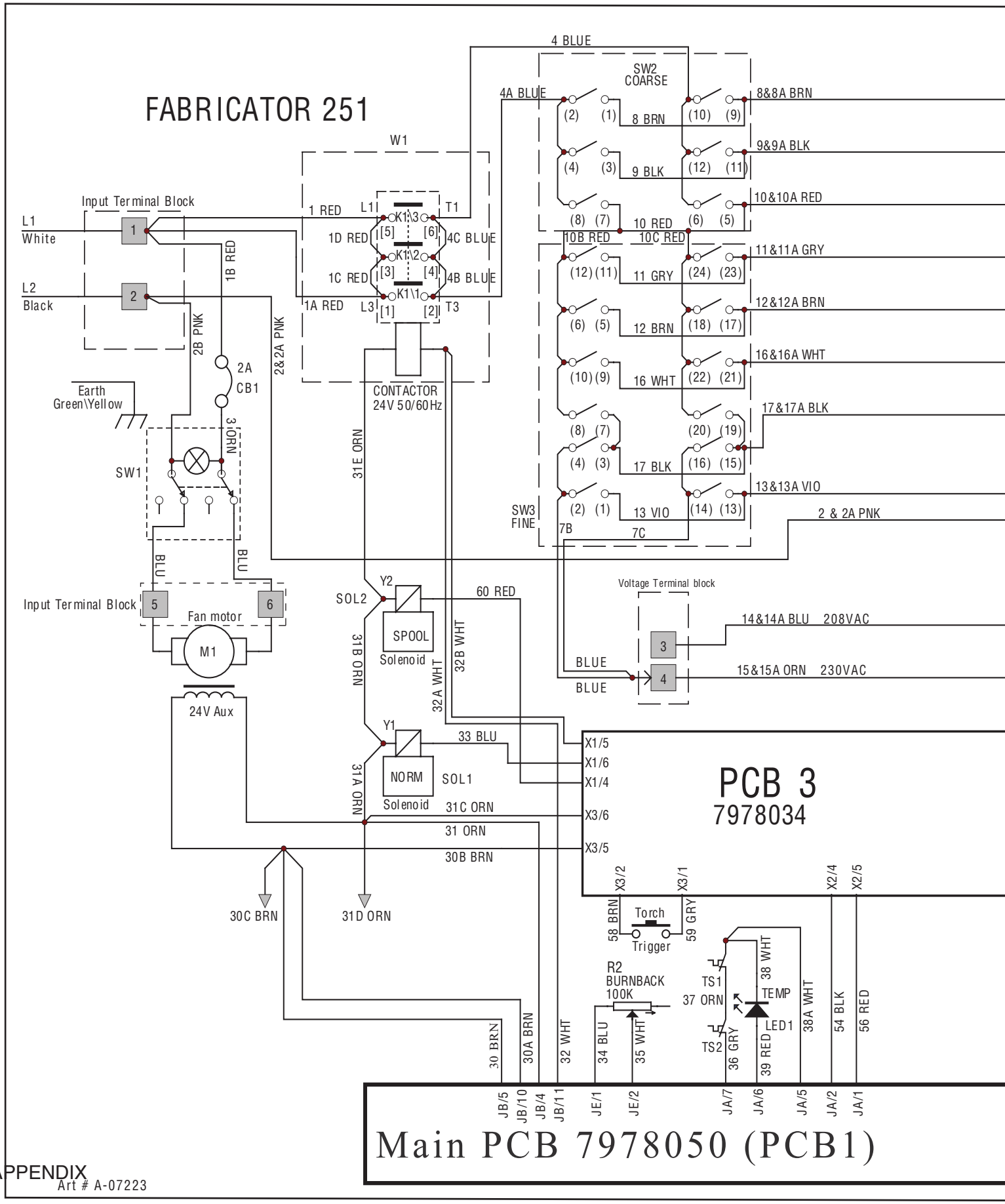
For Tweco/Victor Inquiries and Orders:

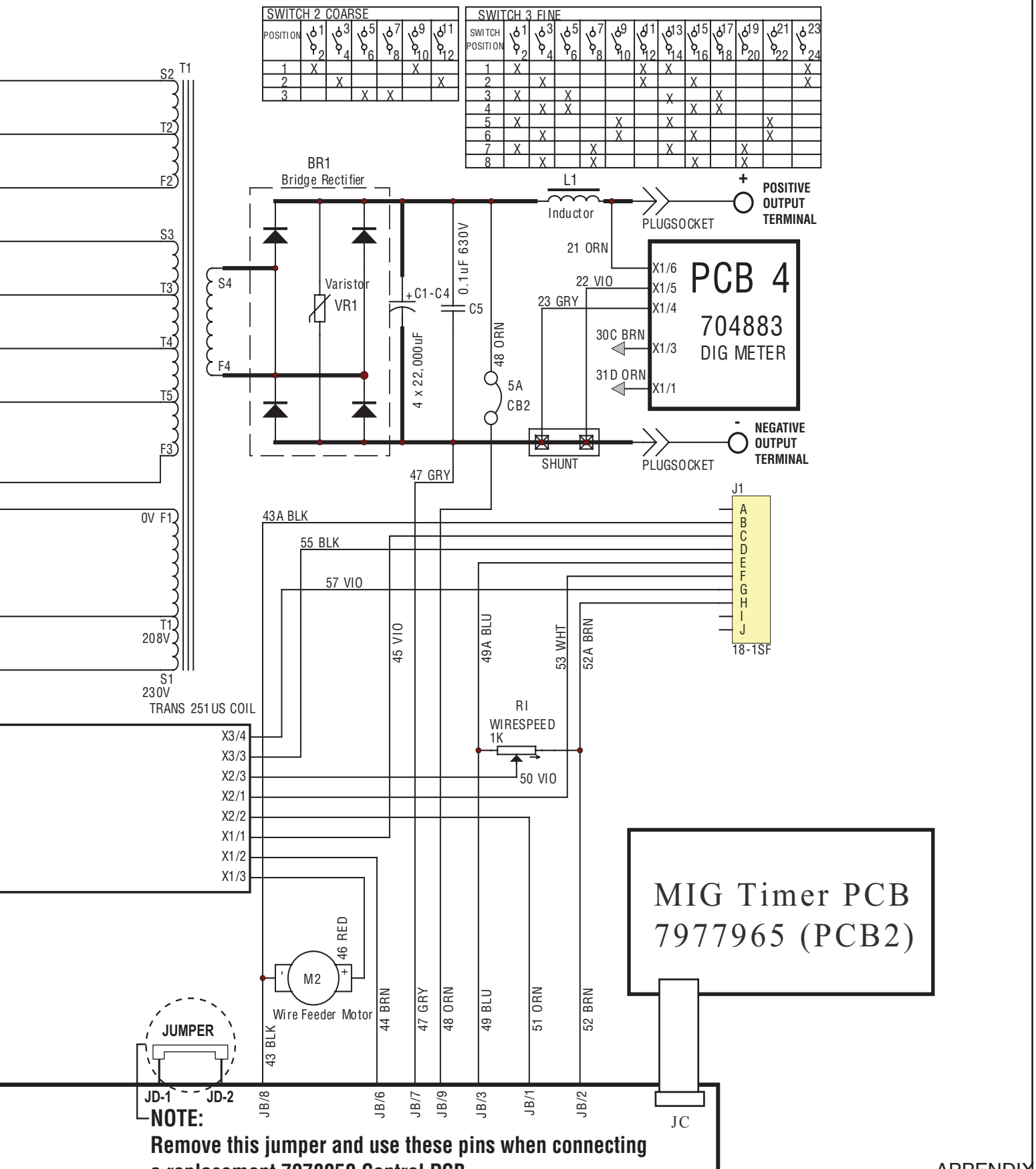
Call 1-800-318-6819 Consumable Parts Management Group

GUNS		
Tweco® WeldSkill 15ft	43340	Gun assembly with 15ft cable (supplied with package), 300 Amp @ 30%
Tweco® No. 4 12ft	412-3545	Gun assembly with 12ft cable, 400 Amp @ 60%
Tweco® No. 4 15ft	415-3545	Gun assembly with 15ft cable, 400 Amp @ 60%
Tweco® Spraymaster 12ft	MS212-3545	Gun assembly with 12ft cable, 250 Amp @ 80%
Tweco® Spraymaster 15ft	MS215-3545	Gun assembly with 15ft cable, 250 Amp @ 80%
Spool Gun 25ft	W4011000	Gun assembly with 25ft cable, 200 Amp @ 60%
Spool Gun 25ft	90906	Gun assembly with 25ft cable, 300 Amp @ 60%
ACCESSORIES		
Victor Regulator/Flow Meter Mixed Gases	0781-2723	Medalist™ 1400 Series, HRF Flow Meter Regulator, Argon-Argon/CO2 mix gases
Victor Regulator/Flow Meter CO2	0781-2725	Medalist™ 1400 Series, HRF Flow Meter Regulator, CO2 gas
TIPS		
	14-23	.023” (0.6mm)
	14-30	.030” (0.8mm)
	14-40	.035” (0.9mm)
	14-35	.040” (1.0mm)
	14-45	.045” (1.2mm)
	14-116	1/16” (1.6mm)
NOZZLES		
	24A-38	3/8” (9.5mm)
	24A-50	1/2” (12.7mm)
	24A-62	5/8” (16mm)
	24A-75	3/4” (19mm)
CONDUITS		
	42-23-15	.023”, 15ft (7.6m)
	42-3035-15	.030”-.035”, 15ft (4.5m)
	44-3545-15	.035”-.045”, 15ft (4.5m)
	44N-3545-15	.035”-3/64”, 15ft (4.5m)
	44-116-15	1/16” 15ft (4.5m)

APPENDIX 2: POWER SUPPLY CIRCUIT DIAGRAM

- Note the model number shown on the equipment nameplate





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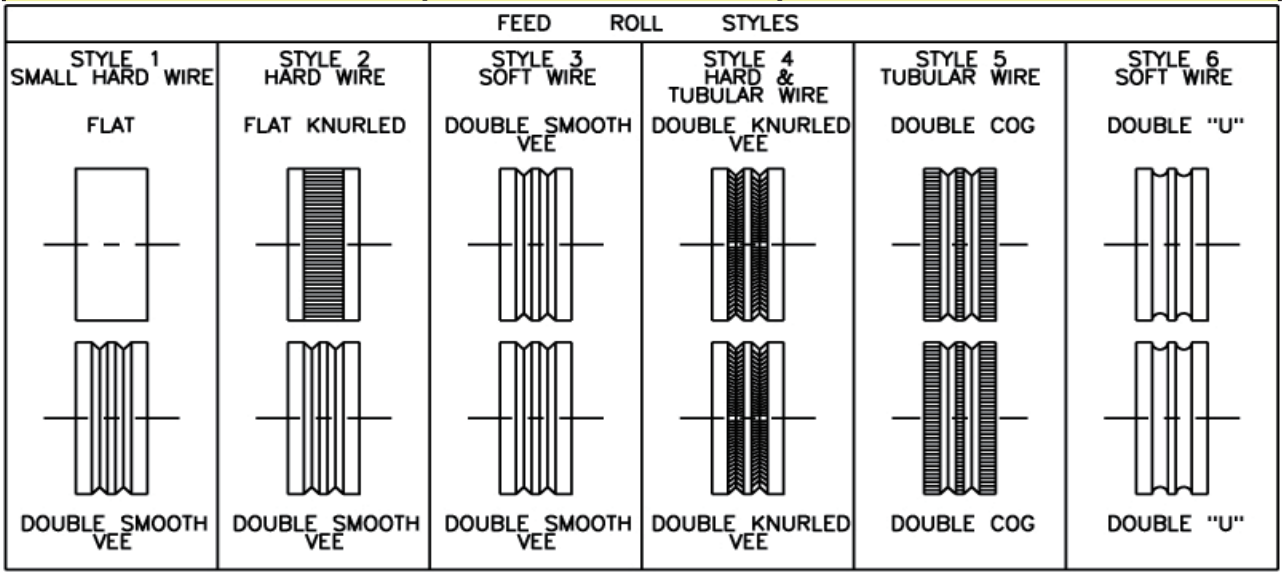
APPENDIX 3: FEEDROLL KITS

FEED ROLL KITS (#375980-Series) 2 ROLL



	Style 1	Style 2	Style 3	Style 4	Style 5	Style 6
Top	Flat	Flat Knurled	Double Smooth "V"	Double Knurled "V"	Double Cog	Double "U"
Bottom	Double Smooth "V"	Double Smooth "V"	Double Smooth "V"	Double Knurled "V"	Double Cog	Double "U"
Wire Type	Hard	Hard	Soft/Hard/Tubular	Hard/Tubular	Tubular	Soft (Aluminum)
Wire Size						
.024" / 0.6mm	375980-031	-	-	-	-	-
.030", .035" / 0.8, 0.9mm	375980-001	375980-003	375980-010	-	-	-
.030", .035", .045" / 0.8, 0.9, 1.2mm	375980-028*	375980-029	-	-	-	-
.035" / 0.9mm	375980-040*	-	-	-	-	375980-032
.035", .045" 3/64" / 0.9, 1.2, 1.2mm	-	-	375980-030	-	-	-
.045" / 1.2mm	375980-002*	375980-004	-	375980-092	375980-022	-
3/64 / 1.2mm	-	-	375980-011	-	-	375980-033
.052" / 1.3mm	375980-090*	-	375980-012	-	-	-
.052", 1/16" / 1.3, 1.6mm		-	-	375980-017	375980-023	-

Notes: 1) One Kit (# 375980-028) is supplied standard with each wire feeder.

2) Feed Roll Kits include: Drive Rolls; Input & Output Guides

3) Narrow 30° "V"

STATEMENT OF WARRANTY

(as of March 15, 2009)

LIMITED WARRANTY:

THERMADYNE warrants that its products will be free of defects in workmanship or material. Should any failure to conform to this warranty appear within the time period applicable to the THERMADYNE products as stated below, THERMADYNE shall, upon written notification thereof and substantiation that the product has been stored, installed, operated, and maintained in accordance with THERMADYNE's specifications, instructions, recommendations and recognized standard industry practice, and not been subject to misuse, repair, neglect, alteration, or accident, correct such defects by suitable repair or replacement, at THERMADYNE's sole option, of any components or parts of the product determined by THERMADYNE to be defective.

THIS WARRANTY IS EXCLUSIVE AND IS IN LIEU OF ALL OTHER WARRANTIES, EXPRESS OR IMPLIED, INCLUDING ANY WARRANTY OF MERCHANTABILITY OR FITNESS FOR A PARTICULAR PURPOSE.

LIMITATION OF LIABILITY:

THERMADYNE shall not under any circumstances be liable for special, indirect or consequential damages, such as, but not limited to, damage or loss of purchased or replacement goods, business interruption or loss of profit, or claims of customers of distributor (hereinafter the "Purchaser") for service interruption. The remedies of the Purchaser set forth herein are exclusive and the liability of THERMADYNE with respect to any contract, or anything done in connection therewith such as the performance or breach thereof, or from the manufacture, sale, delivery, resale, or use of any goods covered by or furnished by THERMADYNE whether arising out of contract, negligence, strict tort, or under any warranty, or otherwise, shall not, except as expressly provided herein, exceed the price of the goods upon which such liability is based.

THIS WARRANTY BECOMES INVALID IF REPLACEMENT PARTS OR ACCESSORIES ARE USED WHICH MAY IMPAIR THE SAFETY OR PERFORMANCE OF ANY THERMADYNE PRODUCT.

THIS WARRANTY IS INVALID IF THE PRODUCT IS SOLD BY NON-AUTHORIZED PERSONS.

This warranty is effective for the time stated in the Warranty Schedule beginning on the date that the authorized distributor delivers the products to the Purchaser.

Warranty repairs or replacement claims under this limited warranty must be submitted by an authorized THERMADYNE repair facility within thirty (30) days of the repair. No transportation costs of any kind will be paid under this warranty. Transportation charges to send products to an authorized warranty repair facility shall be the responsibility of the Purchaser. All returned goods shall be at the Purchaser's risk and expense. This warranty supersedes all previous THERMADYNE warrantiesWarranty SCHEDULE

WARRANTY SCHEDULE

(as of March 15, 2009)

The warranty is effective below for the time stated in the Warranty Schedule beginning on the date that the authorized distributor delivers the products to the purchaser. THERMADYNE reserves the right to request documented evidence of date of purchase.

ENGINE DRIVEN WELDERS	Parts / Labor
Scout®, Raider®, Explorer™ Original Main Power Stators and Inductors	5 years / 3 years
Original Main Power Rectifiers, Control P.C. Boards	3 years / 3 years
All Other Original Circuits and Components Including, but not Limited to, Relays, Switches, Contactors, Solenoids, Fans, Power Switch Semi-Conductors	1 year / 1 year
Engines and Associated Components are NOT Warranted by Thermal Arc®, Although Most are Warranted by the Engine Manufacturer. SEE THE ENGINE MANUFACTURERS' WARRANTY FOR DETAILS.	See the Engine Manufacturers' Warranty for Details
GMAW/FCAW (MIG) WELDING EQUIPMENT	**Parts / Labor**
Fabricator® 140, 180, 190, 210, 251, 281; Fabstar® 4030; PowerMaster® 350, 350P, 500, 500P, 320SP, 400SP, 500SP; Excel-Arc® 6045; Wire Feeders: Ultrafeed®, Porta-feed® Original Main Power Transformer and Inductor	5 years / 3 years
Original Main Power Rectifiers, Control P.C. Boards, Power Switch Semi-Conductors	3 years / 3 years
All Other Original Circuits and Components Including, but not Limited to, Relays, Switches, Contactors, Solenoids, Fans, Electric Motors	1 year / 1 year
GTAW (TIG) & MULTI-PROCESS INVERTER WELDING EQUIPMENT	**Parts / Labor**
160TS, 300TS, 400TS, 185AC/DC, 200AC/DC, 300AC/DC, 400GTSW, 400MST, 300MST, 400MSTP Original Main Power Magnetics	5 years / 3 years
Original Main Power Rectifiers, Control P.C. Boards, Power Switch Semi-Conductors	3 years / 3 years
All Other Original Circuits and Components Including, but not Limited to, Relays, Switches, Contactors, Solenoids, Fans, Electric Motors	1 year / 1 year
PLASMA WELDING EQUIPMENT	**Parts / Labor**
Ultima® 150 Original Main Power Magnetics	5 years / 3 years
Original Main Power Rectifiers, Control P.C. Boards, Power Switch Semi-Conductors	3 years / 3 years
Welding Console, Weld Controller, Weld Timer	3 years / 3 years
All Other Original Circuits and Components Including, but not Limited to, Relays, Switches, Contactors, Solenoids, Fans, Electric Motors, Coolant Recirculators	1 year / 1 year
SMAW (Stick) WELDING EQUIPMENT	**Parts / Labor**
Dragster™ 85; 95S Original Main Power Magnetics	1 year / 1 year
Original Main Power Rectifiers, Control P.C. Boards	1 year / 1 year
All Other Original Circuits and Components Including, but not Limited to, Relays, Switches, Contactors, Solenoids, Fans, Power Switch Semi-Conductors	1 year / 1 year
Original Main Power Magnetics	5 years / 3 years
Original Main Power Rectifiers, Control P.C. Boards	3 years / 3 years
All Other Original Circuits and Components Including, but not Limited to, Relays, Switches, Contactors, Solenoids, Fans, Power Switch Semi-Conductors	1 year / 1 year
GENERAL ARC EQUIPMENT	**Parts / Labor**
FirePower® MIG Welders	5-2-1 years / NA
Water Recirculators	1 year / 1 year
Plasma Welding Torches	180 days / 180 days
Gas Regulators (Supplied with Power Sources)	180 days / NA
MIG and TIG Torches (Supplied with Power Sources)	90 days / NA
Replacement Repair Parts	90 days / NA
MIG, TIG and Plasma Welding Torch Consumable Items	NA / NA

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